THE OHIO JOURNAL OF SCIENCE

Volume 88 | April Program Abstracts | No. 2

CONTENTS

97th Annual Meeting
The Ohio Academy of Science

Hosted by The Ohio State University at Newark
April 29-30, May 1, 1988

Theme: Our World:One Environment

Schedule of Symposia, Technical Section Meetings
and Poster Sessions

Friday, April 29, 1988

Saturday, April 30, 1988

Cover: Black Hand Gorge. Dr. Kirtley F. Mather Memorial Commemorative watercolor by Newark artist Robert Mentzer. Original may be seen in the Department of Geology and Geography at Denison University. Limited edition prints are available from the Academy.

General Schedule

FRIDAY, APRIL 29, 1988

8:00 AM	Registration in Hopewell Hall South lobby
9:15 AM	Symposium Section Section J. Natural Resources. "The History of the Ohio Department of Natural Resources". Hopewell Hall Auditorium H 68
9:30 AM	Symposium Section H. Science Education. "Accomplishments of Ohio's Education for Economic Security Act Program". Founders Hall Auditorium F 1101
12:00 Noon	LUNCH in Hopewell Hall H 64
1:00 PM	Symposium Section H. Science Education. "Accomplishments of Ohio's Education for Economic Security Act Program". Founders Hall Auditorium F 1101
1:30 PM	Symposium Section J. Natural Resources. "The History of The Ohio Department of Natural Resources." Hopewell Hall Auditorium H 68
2:00 - 4:00 P.M.	Replication Workshop - WISEMCO - The Women in Science, Engineering and Mathematics Consortium of Ohio Hopewell Hall H 118
2:30 - 4:00 PM	Ohio Biological Survey Executive Committee in Hopewell Hall H 62
5:00 PM	OAS Executive Committee in Hopewell Hall H62
6:00 PM	Joint OAS COUNCIL and OBS Advisory Board Dinner Advance Reservations Required Hopewell Hall Dining Room
7:30 - 9:00 PM	OBS Advisory Board Meeting Hopewell Hall H 116
7:30 - 9:00 PM	Symposium Section F. Geography Geography in Pre-College Education in Ohio Hopewell Hall H 68
8:00 - 9:00 PM	OAS COUNCIL meeting in Hopewell Hall H64
8:00 - 10:00 PM	All-Academy Welcoming Reception in Hopewell Hall H 64

SATURDAY, April 30, 1988

8:00 AM - 3:00 PM	Registration in Founders Hall Auditorium H
9:00 AM	Poster Session in Adena Hall Gymnasium
	Section Meetings. See Contents for specific section programs.
11:00 AM	ALL-ACADEMY LECTURE Adena Hall Gymnasium

"The Future Directions of
The Ohio Environmental Protection Agency"
By Dr. Richard L. Shank, Director
The Ohio Environmental Protection Agency

Dr. Richard L. Shank received his Ph. D. in toxicology from The Ohio State University, Columbus, Ohio, in 1975. He most recently served as manager of the Surveillance and Enforcement Division of Solid and Hazardous Waste Management, where he was instrumental in obtaining the Agency's largest-ever penalty - $10 million. He resigned that position in 1985 to work for the Battelle Institute Columbus Labs, where he was an associate section manager for toxic and hazardous wastes in Battelle's environmental science department. Shank also has previous experience in the OEPA water programs, having supervised water quality functions from 1975 to 1979. Dr. Shank was appointed Director of the OEPA on 23 June 1987.

12:15 P.M.	LUNCH, Hopewell Hall Cafeteria.
1:30 P.M.	Section Business Meetings. See contents for specific sections.
2:00 P.M.	Afternoon Poster Sessions and Section Meetings.
2:00 P.M.	Symposium. The Scientific and Engineering Principles of Environmental Protection. The Ohio Environmental Protection Agency. Founders Hall Auditorium. F 1101
5:00 P.M.	OAS Annual Business Meeting (Members only). Hopewell Hall H 68
5:30 P.M - 6:30 PM	Hospitality Hour Hopewell Hall H 64
6:30 P.M.	Annual Banquet and Awards Ceremony (Reservations required) Hopewell Hall cafeteria

Presidential Address by
Dr. Andrew White
John Carroll University

"The Impingement Mortality? of Fishes at Lake Erie Generating Stations"

Registration & Parking

Registration is required for all meeting participants.

See registration form on last page

+++ Access to meeting rooms by name tag only +++

Pick up name tag at Registration Desk before attending sessions.

Please observe the designated smoking areas on campus.

Meal reservations and payments must be postmarked by Friday, April 22 , 1988.

Make Checks payable to The Ohio State University and mail to:

The Ohio State University at Newark
OAS Registration
University Drive
Newark, Ohio 43055

Phone (614) 366-3321

Friday, April 29, 1988

Free parking in the campus lots.

Registration will be in Hopewell Hall South lobby.

Saturday, April 30, 1988

Free parking in the campus lots.

Registration will be in Founders Hall Auditorium.

Free coffee will be available.

Poster Sessions will be in Adena Hall Gymnasium.

Free coffee will be available.

Meals

Advanced reservations required.

See Registration Form at end of program.

Friday, April 29 Luncheon (Cold Dutch Buffet)..... $7.00

Dinner (Stuffed Pork Chop Buffet.... $7.50
(OAS and OBS Councils and guests)

Saturday, April 30 Luncheon (Italian Lunch) $7.50

Banquet (Chicken Divan) $11.00

A list of restaurants within driving distance of the campus will be available at the registration desk. However, the campus food service, Hopewell Hall Cafeteria, is highly recommended.

Housing

The Granville Inn
314 E. Broadway
Granville, Ohio 43023
614-587-3333

Best Western
50 N. 2nd. St.
Newark, Ohio 43055
614-349-8411

Mid-Town Terrace Motel
W. Church & 7th. St.
Newark, Ohio 43055
614-345-9721

Holiday Inn
733 Hebron Road
Heath, Ohio 43056
614-522-1165

University Inn
1225 W. Church St.
Newark, Ohio 43055
614-344-2136

Howard Johnson
775 Hebron Rd.
Newark, Ohio 43055
614-522-3191

Special Events & Field Trips

Saturday, 30 April 1988

Spouses Program. There will be local maps for the use of spouses who may want to see other local attractions such as the National Heisey Glass Museum, Moundbuilder's State Memorial Park, Webb House Museum, Dawes Arboretum, Robbins Hunter Museum, Licking County Historical Society Museum, and Granville Life-Style Museum.

Sunday, 1 May 1988

8:30 A.M. Geology Section Field Trip.

The 1988 geology field trip will focus on the ice-margin terrain and glacial deposits north and east of Newark with particular emphasis on the evolution of the Black Hand Gorge area. Field stops will include: panoramic overviews to contemplate the complex drainage reversals in the area; exposures of Wisconsinan and Illinoian outwash, loess, and perhaps lacustrine silts; and Black Hand Gorge. While our attention will be directed chiefly to the complex late-Pleistocene glacio-fluvial history of the area, regional bedrock stratigraphy and sedimentary structures can certainly be addressed during our walk through the Gorge. The field trip will leave from the OSUN parking lot at 8:30 A.M. sharp. Field trip participants must furnish their own transportation. Ride sharing is strongly encouraged. Lunch will be on your own. Further information may be obtained from Tod Froiking, Department of Geology and Geography, Denison University, Granville, Ohio,43023, (614) 587-0810.

9:00 A.M. Cranberry Bog State Wildlife Preserve.

The trip will leave from the OSU Newark parking lot at 9:00. Lunch is on your own. Further information may be obtained from Dr. Lee St. John, Department of Biology, The Ohio State University Newark, University Drive, Newark, OH 43055. 614/366-3321.

Symposia

Friday, 29 April 1988

9:30 A.M. & 1:00 PM — Accomplishments of Ohio's Education for Economic Security Act Program. Section H. Science Education.

9:30 A.M. & 1:30 PM — The History of the Ohio Department of Natural Resources. Section J. Natural Resources

7:30 P.M. — Geography in Pre-College Education in Ohio Section F. Geography

Saturday, 30 April 1988

2:00 P.M. Scientific and Engineering Principles of Environmental Protection. The Ohio EPA.

Check registration desk for further information or write: OEPA Symposium, The Ohio Academy of Science, 445 King Avenue, Columbus, OH 43201. Phone 614/424-6045.

Local Arrangements

LOCAL ARRANGEMENTS CHAIRPERSON

Raymond F. Jezerinac
The Ohio State University at Newark (OSUN)

LOCAL SECTIONAL HOSTS

A. Zoology	G. Whitney Stocker Student, OSUN
B. Plant Science	Dr. Ken Loats Denison University
C. Geology	Dr. James Bradley OSUN
D. Medical Sciences	Mrs. Edna Covendale, RN Central Ohio Technical College
E. Physics & Astronomy	Dr. Bruce Mainland OSUN
F. Geography	Dr. Robert Klingensmith OSUN
G. Chemistry	Mrs. Karen Scott Student, OSUN
H. Science Education	Dr. Diane Cantrell OSUN

I. Anthropology & Sociology	Dr. Shirley Palmer OSUN
J. Natural Resources	Ms. Kim Baker Student, OSU
K. Genetics & Cell Biology	Dr. Bonnie Lee Lamvermeyer Denison University
L. Mathematics & Computer Science s	Dr. Gary Deatsman OSUN
M. Psychology	Mrs. Jean Ischium Student, OSUN
N. Junior Academy	Dr. Eve Freeman OSUN
O. Engineering	Dr. Robert Pound Central Ohio Technical College
Q. Economics	Dr. William Henderson OSUN
R. Ecology	Dr. Lee St. John OSUN
S. Information & Library Science	Mr. William Snyder OSUN

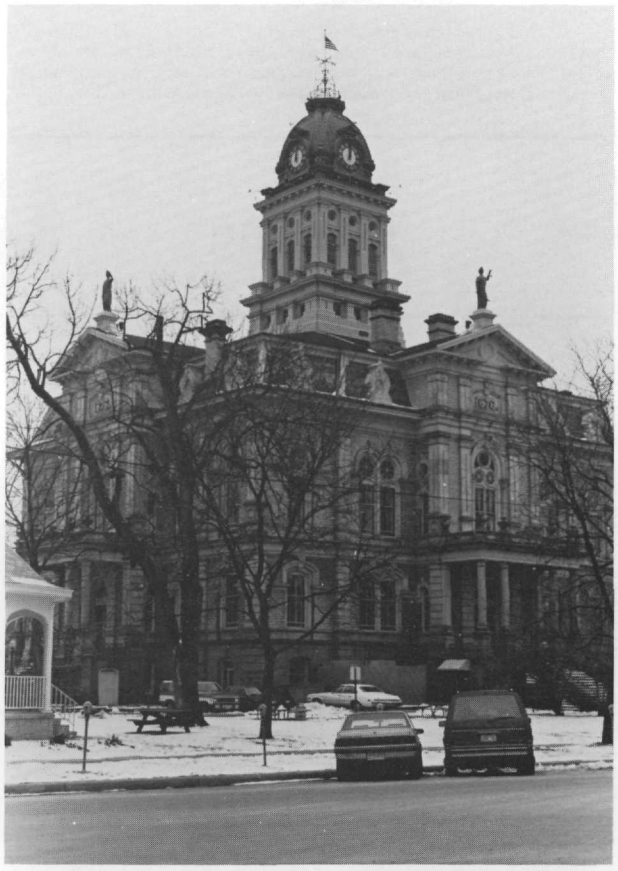
Our Host

The Ohio State University at Newark and The Central Ohio Technical College comprise the Newark Campus. The campus is situated on 155 acres on the west side of Newark. The Ohio State University at Newark, founded in 1957, was the first regional campus of OSU. Evening classes were first offered at the old Newark Senior High School. In 1966, the community decided to make permanent facilities available. Seven thousand citizens pledged over one million dollars as a match from state legislation toward the cost of buying land and construction of the first building. The first building, Founders Hall, was completed in 1968. Hopewell Hall was opened in 1976 and Adena Hall was completed in 1987. In autumn 1986, privately-owned and operated student apartments opened next to the campus.

Ohio State Newark offers one to three years of study toward most of Ohio State's 200 undergraduate degree programs. The campus also provides a complete baccalaureate degree program in Early and Middle Childhood Education. The Associate of Arts Degree is awarded to students who have completed two years of specific study. Newark Campus students benefit from the same high quality of instruction available on the Columbus Campus but with the additional advantage of smaller class sizes. About 90% of the regular teaching faculty hold the doctoral degree.

OTHER RESOURCE PEOPLE

Conference Coordinator	Mrs. Zoe Bechtol
Registration & Ticket Sales	Mr. John Wright
Welcoming Committee & Banquet	Dr. Tom Hays
Room Arrangements	Mr. James Woolard
Hosts	Dr. Lee St. John
Audio-visuals	Mrs. Marie Dacus
Meals & Receptions	Mrs. Barbara Moody
Publicity	Mr. Terry Blosser
Directional & Parking Signs	Mrs. Karen Crouch
Dean of OSUN	Dr. Julius Greenstein



Newark is the county seat of Licking County, Ohio's third largest county. In 1802 General William C. Schenck, G. W. Burnet, and John Cummins decided that the confluence of the forks of the Licking River (then called the "Pataskala" by the Indians appeared to be a good place for a settlement. Thus Newark was founded in a maze of prehistoric Indian earthworks, obviously evidence of a great civilization that once inhabited the area. These mounds of earth, shaped in circles and squares and other forms, have been the subject of much study. Two large groups of these mounds are preserved today in Moundbuilder's and Octagon State Memorials.

In 1825, at a spot just outside Newark, construction of the Ohio Canal was begun with Newark being the hub of the canal system between Lake Erie and the Ohio River. The year 1852 saw the first railroad come into Newark. The National Road (U.S. Route 40) passes through the southern portion of the county.

Some 95 manufacturing establishments in the Newark area produce over 300 specific products, valued at nearly $1.2 billion annually. The Owens Corning Technical Research Center, the Dow Chemical Research Center, and The Newark Air Force station are located in the area.

SYMPOSIUM - ACCOMPLISHMENTS OF OHIO'S EESA PROGRAM

Founders Hall Auditorium
Friday, April 29, 1988
Garry McKenzie, Presiding

9:00 **Introduction - Garry McKenzie**

9:15 INSERVICE PROGRAM FOR TEACHERS 5 - 9 TO USE THE TOLEDO ZOO MORE EFFECTIVELY
Harold Lee, David Jenkins* & Jerry Underfer
The University of Toledo, Toledo, OH 43606
and the Toledo Zoological Gardens, Toledo, OH 43609.*

Thirty middle school teachers from Northwest Ohio participated in a summer and inservice program designed to provide them with zoological and environmental knowledge which would help them benefit from field trips to the Zoo. Teachers redesigned and improved existing educational materials. Heretofore resource materials were not available for secondary school use. The lesson materials that have been prepared pre-, on-, and post-site are a culmination of the information gained from the program. Samples of the materials, some developed for the program, will be available at the session.

9:30 MIDDLE SCHOOL STUDENTS AND MATHEMATICAL PROBLEM SOLVING STRATEGIES: TELETRAINING THE TEACHERS
Jerry K. Stonewater & David Kullman, Department of Mathematics and Statistics, Miami University, Oxford, OH 45056.

This presentation describes changes in problem solving ability of middle school students whose teachers participated in a semester long "teletrained" course in mathematical problem solving and its applications to middle school teaching. Results are from the EESA grant, "A Teletraining Delivery System for Mathematics Inservice in Problem Solving".

1) Description of the "teletrained" class Teletraining is a method of delivering instruction from Miami University to two different teacher locations in rural Ohio communities. Delivery is via computer connections using an IBM-PC at each site for pre-designed "slide" presentation and written communication via an auxillary pad, and simultaneous "conference call" voice connection between all sites.

2) Description of the mathematics content taught to the teachers Six problem solving strategies were taught. Guess and Check, Working Backwards, Elimination, Recognizing Patterns, Simulation, and Simpler Problem. Teachers also kept journals of experiences implementing each strategy.

3) Results of pre-to-post course changes in the problem ability of the teachers' students No male-female difference was found. Obtaining a correct answer and using a correct improved pre-topost test.

9:45 TWO PROGRAMS IN MATHEMATICS FOR MIDDLE SCHOOL TEACHERS. Harvey Wolff, Department of Math., University of Toledo, Toledo, Ohio 43606.

Over the past two years a group of faculty from the University, in conjunction with local school districts, have been funded by the EESAP program through the Ohio Board of Regents to provide instruction aimed at middle school teachers. The programs involved faculty from the Department of Mathematics and the College of Education. The first program was for middle school teachers who only held an elementary certificate. Such teachers may find themselves teaching a substantial amount of mathematics, despite a limited background. The subject matter taught in this program was algebra, and geometry, as well as problem solving, and the classroom use of calculators and computers. Thirty classroom teachers were enrolled, meeting at a local school from September to May. In our second program, currently in progress, the subject matter is probability and statistics. This program also involves work with computers, as well as teaching techniques for implementing the material in the classroom. The format involves classroom sessions at a local school and a week long intensive session during the summer. Thirty classroom teachers are enrolled in this program also. Details of these two programs, including information on content, administration, costs, and evaluations will be discussed.

10:00 DMP: MAKING TEACHERS DISCRETE
Canenal Mika Onrea and Lee K. Sanders
Department of Mathematics and Statistics
Miami University, Oxford, Ohio 45056

The Discrete Mathematics Program (DMP) was designed to prepare high school mathematics teachers to incorporate discrete mathematics and applications into their existing curriculum. During Summer 1987, 15 high school mathematics teachers and 6 mathematically-talented high school students participated in this program which consisted of a graduate discrete mathematics course and two concomitant workshops for the teachers and a parallel undergraduate discrete mathematics course for the high school students.

The first workshop consisted of computer labs field trips, method classes, and the weekly problem solving sessions where the teachers, students, and university faculty worked, in collaboration, on problems presented by representatives from industry or business. (The high school students participated in everything but the methods classes). The second workshop was a one-week independent study during which the teachers worked with university faculty members preparing classroom materials and planning Fall 1987 inservice sessions for teachers in their home school districts. Both workshops and inservice programs were designed to prepare these teachers to assume the role of teacher-leader and mathematics resource person in their home district, as well as to foster a continuing collegial relationship between the teachers and the university faculty.

10:15 THE OHIO STATE UNIVERSITY CALCULATOR AND COMPUTER PRECALCULUS PROJECT MIDCOURSE REPORT
Gregory D. Foley, The Ohio State University, 202 Arps Hall, Columbus, OH 43210-1172

This is a three-year, field-based project aimed at developing an interactive computer graphics-based precalculus course. It is being funded by the Education for Economic Security Act Program of the Ohio Board of Regents, the National Science Foundation, The Ohio State University, and the Standard Oil Corporation (Ohio). Three main objectives are (a) to create instructional materials that make effective use of computer- and calculator-based graphing to strengthen student problem solving skills; (b) to improve student understanding of functions, graphs, and analytic geometry--critical areas of mathematical deficiency in the current college preparatory curriculum; and (c) to increase significantly the number of students adequately prepared to pursue higher education in mathematics, science, and technical fields. The interactive-graphics approach (a) encourages abstraction, (b) provides a powerful problem-solving tool, (c) permits an early exposure to numerical analysis, (d) facilitates exploration, and (e) provides a foundation for the study of calculus. A particularly constructive feature of the development process is the incorporation of the judgement and experience of classroom teachers into the design and revision of the student and teacher support materials. Results will become available after the June 1989 conclusion of the project.

10:30 **Break**

10:45 WINNING IN SCIENCE EDUCATION: THE USE OF PEER HIGH SCHOOL SCIENCE TEACHERS FOR IN-SERVICE EDUCATION AT WRIGHT STATE UNIVERSITY, Lois Cook and Dorothy Winkeljohn, Wright State University, Dayton, Ohio 45435.

WISE-I and WISE-II were jointly developed by the College of Science and Engineering/College of Science and Mathematics and the College of Education and Human Services at Wright State University and teacher planning representatives. The programs provided in-service education to improve teaching skills of middle school science teachers (grades 5-8) in seven counties. WISE-I included Biology, Chemistry, Geology and Physics. WISE-II included Biology, Chemistry, Computer Science, Geology, Mathematics and Physics.

An outstanding unique program feature was the use of peer high school science teachers who served as course instructors in the classrooms/laboratories along with University faculty.

The curriculum in all courses was designed to upgrade subject matter knowledge and application skills and to generate positive affective changes. Instructional techniques and experiences provided/promoted a hands-on approach to science learning, (utilizing demonstrations, experiments, and field trips) and the creative use of community resources as curricular aids. A manual of segmented science modules was developed for teachers to use and implement in their own classrooms. Manuals are available at $20.00 each.

11:15 PROJECT ADVANCE, Cullen Johnson, Cuyahoga Community College, (CCC) 11000 Pleasant Valley Rd. Parma OH 44130

Project Advance is designed to develop an awareness of science and mathematics technology and career options for a historically underrepresented and underserved population, and address the need to integrate the study of science and math in Cleveland Public Schools and selected private school curriculum. Specifically, Project Advance trains teachers:to recognize the interactions of science and math concepts; to use the strategies for teaching thinking skills, provides teachers with a correlation of such interrelated concepts to the curriculum identified for each field of study. Activities include in-service for science and math teachers. CCC provided the facilities, equipment,&supplies. Notre Dame College of Ohio provided instructors and expertise for teachers in-service and John Carroll Univ. provided the opportunity for teachers to earn two credit hours. Program ran Feb - June 1987 for 23 sixth grade and 15 eighth grade teachers and Sept - Dec 1987 for 12 sixth grade teachers. Participants were able to practice what they learned in the workshops in their classes. Excellent ratings were received on both the overall project and participant attitudinal survey. Indications were that needs were being met and continuation of training warranted.
The grant sum of $25,725 covered all workshop costs and graduate fees for participants.

11:30 HANDS ON DEVELOPMENTAL MATHEMATICS AND SCIENCE Terrence P. Toepker, Dept. of Physics,Xavier U. 3800 Victory Pkwy., Cincinnati, OH 45207 **

Six workshops, each two weeks long, were presented for teachers of grades 5-9. The operation of the workshop will be described using materials and slides. As time permits, some sample materials and activities will be demonstrated.
During the summers of 1986 and 1987, faculty from math, physics, and psychology presented concepts, demonstrations, and laboratory experiments from 9:00 AM until 4:00 PM each day. Mathematics and physical science were integrated with developmental learning theories. The psychology team member worked hard at the alleviation of "math and science anxiety." A notebook, a class presentation, and a final written examination were required for completion of the workshop and the awarding of four graduate credit hours. A total of 144 participants were selected from over 200 applicants. Each participant paid a fee of $100. The balance of the operating funds were provided by a grant from the Ohio Board of Regents. Area schools aided in the selection of participants and, in some cases, paid the fee for the teachers.
Additional information may be obtained from T.P. Toepker at the above address.

** Work supported under Ohio's EESA program.

11:45 Summer Computer, Language and Science School *Andrew J. Frese, Department of Education* Muskingum College, Montgomery Hall, New Concord, OH 43762-1199

This project was designed to strengthen existing knowledge of computer learning, foreign language and the sciences for students living in a four county area in Southeastern Ohio (Coshocton, Guernsey, Muskingum, and Noble). Evaluation was conducted using the pre and post testing method. Intensive course work was provided to identified talented and gifted youth entering grades five through nine in the areas of physics, chemistry, geology, biology, German, and computer use. A college English composition for science course was provided for nine students entering grades 11 and 12.

More than 150 students participated in this project. The results indicated a significant difference in pre and post test scores for all course work (except chemistry) ($p > .05$ Further, a post test given at least six months later indicated long term retention occurred at the .05 level of significance.

12:00 Noon **Lunch**

1:30 SCIENCE ABOUT US: AN INTEGRATED SCIENCE PROGRAM FOR TEACHERS AT CLEVELAND STATE UNIVERSITY. W. B. Clapham, Jr. Department of Geology, Cleveland State University, Cleveland, Ohio, 44115

Science About Us is a cooperative effort involving the Cleveland State University Colleges of Arts & Science and Education. It started with an intensive summer program in 1986, involving faculty from 5 departments in the sciences and mathematics, and continued through the school year with workshops in the College of Education. This program was followed in 1987 as well, except that the summer program also included personnel from the Cleveland Museum of Natural History and the Metroparks Zoo. The geology department has developed several new graduate courses intended to serve working teachers, and several other departments have made courses available to this audience as well. As of the summer of 1988, we anticipate that all of these courses will be able to continue on a self-sustaining basis.

We regard the program as successful. There have been problems: logistic, personality, and political. On the whole, acceptance of the program by working teachers has been very good, and morale among the A&S science/math faculty has been very high. The modular approach which we adopted should enable the program to respond in the future to expansion and contraction of the audience, and it should be widely applicable to other parts of the State.

1:45 SCIENCE EXPERIENCES FOR JUNIOR HIGH SCHOOL STUDENTS. David J. Ager and Gordon A. Parker. Chemistry Department, University of Toledo, Toledo, OH 43606-3390

An EESA supported program was held during the summer and fall 1986 for approximately forty junior high school students. Two weeks of summer activities centered about the general theme of color. Hands-on experiments in the laboratory delt primarily with chemical testing relating to color and with chemical synthesis, for example, of a dyestuff and use of the dye to color cloth. Field trips, as part of the program, were to a paint factory and other related industries. In four fall follow-up sessions students heard guest speakers, from an automible paint supplier, a portrait artist and others.

2:00 TRAINING PROGRAM FOR MIDDLE SCHOOL LIFE SCIENCE TEACHERS: Ann M. Ackermann-Brown, Assistant Dean, College of Biological Sciences, O.S.U., 484 W. 12th Ave., Columbus, OH, 43210.

A year-long program (1986-87) consisting of two graduate credit workshops was provided for 22 teachers from Columbus Public Schools and Catholic Diocese of Columbus Schools (grades 3-8). The first workshop was conducted by OSU faculty and included lecture-discussion sessions on important areas of biology as well as innovative laboratory and field exercises. The second workshop consisted of meetings of teachers and university staff in which help was provided in implementing concepts and exercises already learned and assisting teachers to plan and implement their own laboratory exercises. Materials were provided in classroom amounts so that activities could be carried out in the schools. The second workshop culminated with a two-day meeting in the spring when teachers reported, demonstrated and discussed their activities with members of the OSU staff.

Evaluation data indicates that the teachers have an increased knowledge of biology, use more laboratory activities in class, began to innovate laboratory activities and are generally more confident in their use of instructional materials. More than 700 of the teacher's students were evaluated and their interest in science increased. There was a significant correlation between the number of activities used by the teachers and the extent to which students liked science.

2:15 **TEACHING SCIENCE WITH TOYS, A PRE-COLLEGE TEACHER WORKSHOP, Theresa Mulligan and Arlyne M. Sarquis, Chemistry Department, Miami University-Middletown, Middletown, OH 45042, Jerry L. Sarquis, Chemistry Department, Miami University, Oxford OH 45053, and John P. Williams, Chemistry Department, Miami University-Hamilton, Hamilton, OH 45011.**

Our four credit workshop exhorts and instructs 72 teachers (one chemistry and one physics staff member per grade level: K-3, 4-6, 7-9, and 10-12) in the use of toys in hands-on chemistry and physics activities. The application of scientific principles to common-place objects such as toys increases a student's interest in science. The supplemental rather than replacemental nature of these activities facilitates their integration into a science curriculum. Lower grade teachers increase their understanding of basic physical science principles: states of matter, mixtures, reactions, polymers, motion, energy and heat, fluids, electricity and magnetism, and waves. High school teachers acquire new techniques and serve as resource persons within their intra-district support network. Five Friday-Saturday sessions held

throughout the academic year allow teachers to evaluate activities in their own classrooms between meetings. In the final session, teachers present two of their own toy-based activities.

2:30 TEACHING SCIENCE WITH TOYS: RESULTS AND EVALUATION. Beverley A. P. Taylor and James Poth, Department of Physics, Oxford, OH 45056.

We have completed and evaluated a very successful program in which in-service teachers (kindergarten through high school) have learned ways to use toys to enhance their teaching of physics and chemistry. Detailed written and oral evaluations were carried out at the end of the program. Topics addressed included how the workshop had influenced their understanding of physics and chemistry, their enthusiasm for teaching these subjects, and the amount of time they spend in hands-on activities. In addition a follow-up study has been done to determine if the teachers are still using the material, if they have shared the information with other teachers, and if they were able to obtain funds to buy additional toys for their classroom. Summaries of these evaluations will be presented. Success stories will be shared as well as a few problems which were encountered. Changes which have been made in our second trial of the workshop as a result of the evaluation will be discussed.

2:45 **Break**

3:00 INTRODUCING FOREIGN LANGUAGES IN ELEMENTARY SCHOOL. Ted ELDRIDGE, Akiko JONES, Timothy POGACAR, Jo-Anne MARTIN-REYNOLDS. Dept. of GREAL, Bowling Green State Univ., Bowling Green, OH 43403.

Bowling Green State Univ. modern language and education faculty in collaboration with three schools began a foreign language program that involved over three hundered elementary pupils and ten university student instructors per semester. The program subsequently expanded to a total of seven schools, approximately 450 pupils, and thirty-two instructors. The main goals of teaching beginning language skills and cultural concepts for French, German, Japanese, Russian, and Spanish were met, according to classroom testing. Evaluation questionnaires indicate a uniformly favorable pupil response and interest in further study; parental attitudes were already favorable and thus not effected. Teaching observation showed that instructors who are not education majors are capable of acquiring satisfactory teaching techniques for this small-group experience with approximately twenty hours of training. School principals judged the program most beneficial where a language/culture class parallels social studies content in grades two-six. They also believe that basic exposure to a foreign language is the primary goal for this particular pupil population. Questions remain concerning sequencing of lessons, classroom teacher involvement, most appropriate grade levels (especially as concerns Japanese and Russian), and sources for continuance.

3:15 THE MUSKINGUM COLLEGE/OHIO BOARD OF REGENTS EARTH SCIENCE FIELD EXPERIENCE FOR MIDDLE SCHOOL AND HIGH SCHOOL SCIENCE TEACHERS. LAW, Eric W., and KOVACH, Jack, Department of Geology, Muskingum College, New Concord, Ohio 43762

According to a preliminary survey, the formal geological education of 90% of middle and high school Earth Science teachers in southeastern Ohio consists of no more than two courses. Still fewer teachers have had sufficient geological field experience to enable them to confidently conduct a field trip in their Earth Science classes. In August, 1987, with financial support from the Ohio Board of Regents, the Muskingum College Geology Department conducted a program in which 11 science (including earth science) teachers from southeastern Ohio were afforded the opportunity to obtain hands-on experience in geological field methods and to gain a better understanding of the geology of Ohio and the Appalachian Mountain region. The program consisted of 2 days spent in the classroom in a review/overview of geological principles and processes, followed by 5 one-day field trips in Ohio and a 3 1/2 day trip through the central Appalachian Mountains. The activities and features at each stop on each of the field trips were videotaped, and a copy of the edited tape was distributed to each participant. A field guidebook on the geology of eastern Ohio, written specifically for middle school and high school use, and including site descriptions and suggested exercises for students, has been prepared as part of the project. The videotape and field guidebook are available from Eric Law.

3:30 ENVIRONMENTAL SCIENCE INSTITUTES FOR TEACHERS OF GRADES 5-9. Elliot J. Tramer, Department of Biology, University of Toledo, Toledo, Ohio 43606.

EESA-supported institutes in environmental science were conducted at the University of Toledo during summer, fall, and spring of 1986-87. All-day sessions included lecture/discussion of concepts in the mornings and laboratory/field exercises each afternoon. Goals were to expose participants to (a) principles of ecology, (b) relevance of ecological principles to human concerns, and (c) lab and field exercises demonstrating those principles that could be adapted to their classrooms. Examples of (c) will be presented. Participants were 73 science teachers of grades 5-9 from northwestern Ohio. Each received graduate course credit; their grades were based entirely on detailed journals of our activities kept by each participant. Evaluation questionnaires were devised by an unbiased outside observer, and were distributed to the participants at our final meeting each session. The evaluation responses will be reviewed briefly.

3:45 ENHANCING SCIENCE EDUCATION VIA THE LOCAL ENVIRONMENT (*). Thomas B. Cobb, Center for Environmental Programs, Bowling Green State University, Bowling Green, OH 43403

Through the mechanism of a summer workshop, thirty-nine science teachers (grades 6 - 9) in northwest Ohio were introduced to local environmental resources for the purpose of promoting the use of such resources to enhance science education in the classroom. Topics of environmental geology, ecology, species preservation, land conservation, water quality, and biotechnology were used to provide a science basis for field experiences. Sites visited included local streams and rivers, wildlife refuges, an estuary on Lake Erie, a farm, water treatment facilities, and the local zoo. Activities pursued during the workshop were extended to the classroom through the development of curricular modules which were shared by all teachers. Networking of participants is still continuing with stream quality monitoring serving as an important common focus. The program is generic and versatile, may be adapted to many grade levels, and is easily replicable in other locations. Sample curriculum materials as well as slides of the field trips and other activities are available.

(*) Supported by the Ohio Board of Regents through a grant from the Education for Economic Security Act.

SYMPOSIUM - HISTORY OF THE OHIO DEPARTMENT OF NATURAL RESOURCES

Room 68 Hopewell Hall
Friday, April 29, 1988
Robert Priddy, Presiding

8:00 **Registration**

9:15 THE OHIO DEPARTMENT OF NATURAL RESOURCES Joseph J. Sommer, Director, ODNR, Fountain Square, Bldg. D-3, Columbus, OH 43224

As mandated by law, the concerns and responsibilities of ODNR are the anchor threads of a viable and enduring social and economic society, thereby our very existence. Since its creation in 1949, the Department has provided leadership and assisted with land, water, and forestry management, inventoried mineral resources, regulated the extraction of oil and gas and land reclamation, provided excellent recreation facilities and efficiently managed the wild life resources (including endangered plants and animals) for the enjoyment of a diversified constituency. The future holds new and complex challenges; air pollution, acid rain, energy, hazardous waste, water contamination and overflowing land fills are just a few of the problem areas we face. The complexity of our past challenges are greatly dwarfed by those on the horizon and beyond. During the nearly 40 years since its creation many Department adjustments have been made for economy and efficiency in fulfilling its legal and moral mandates. There is no need to fear the future. With public understanding, ample funding, teamwork among concerned agencies and a dedicated profes-

ional staff, nothing is impossible. Many of the challenges ahead are local, state, national and international in scope. To meet such challenges our strategic plan will have to be designed to fit into a national and international network and at the same time provide for proper husbandry of Ohio's resources at the local and state levels.

9:30 ODNR: BORN OF DEEP ROOTS
SHERMAN L. FROST
School of Natural Resources, The Ohio State University, Columbus, Ohio 43210

Before 1949, Ohio had created several conservation agencies. In 1908, the Ohio Academy of Science recommended a single state conservation commission. In the early 1920's, the League of Ohio Sportsman, and Izaak Walton League, sought a consolidated role for conservation which ended with a conservation agency in the Department of Agriculture -- but mostly wildlife oriented. Then from 1943-1948 an Ohio Post-War Commission created conservation committees which recommended forming a single natural resources department and drafted a bill. On January 12, 1949 famous Senate Bill 13 was introduced, and it passed April 20, 1949, and an Ohio Department of Natural Resources (ODNR) became a reality with Governor Frank J. Lausche's signature on August 11, 1949. The initial act brought in Geological Survey, Froestry, Wildlife, Water, Shore Erosion and Parks from other departments and made them separate divisions with a new Division of Lands and Soil. Several new divisions and offices have been added since 1949 and two divisions have been absorbed. A.W. Marion was the first Director-1949-1957; Herbert B. Eagon, 1957-1963; Fred E. Morr, 1963-1971; William B. Nye, 1971-1975; Robert W. Teater, 1975-1983; Myrl H. Shoemaker, 1983-1985; Joseph J. Sommer, 1985-

9:45 HISTORY OF THE DIVISION OF GEOLOGICAL SURVEY.
M.C. Hansen, H.R. Collins, ODNR, Division of Geological Survey, Fountain Square, Columbus, OH 43224, R.J. Bernhagen, 5916 Linworth Rd., Worthington, OH 43085.

The Division of Geological Survey of the Ohio Department of Natural Resources is the oldest legislatively authorized natural resources agency in the state. The Survey was created on March 27, 1837, and was intermittently active during the 19th century. Since 1900 the Survey has given continuous service to Ohio in pursuit of its mission to study and report on the geology and mineral resources of the state in order to enhance industry, education, and the public health and welfare. In 1949 the Geological Survey became one of the seven originally chartered divisions of the newly created Ohio Department of Natural Resources. Ten State Geologists have served as leaders of the Survey during more than a century and a half of activity: W.W. Mather (1837-1838); J.S. Newberry (1869-1882); Edward Orton (1882-1899); Edward Orton, Jr. (1899-1906); J.A. Bownocker (1906-1928); W.E. Stout (1928-1946); G.W. White (1946-1947); J.H. Melvin (1947-1957); R.J. Bernhagen (1957-1968); H.R. Collins (1968-present). Under the leader ship of these individuals the Geological Survey has become the principal source of geologic information on Ohio and has published more than 30,000 pages of maps and reports on the state's geology.

10:00 A HISTORY OF ODNR'S DIVISION OF WILDLIFE
Merrill Gilfillan, 63 N. Walnut St., Mt. Gilead, OH 43338; Clayton Lakes, Chief, Wildlife, C-4, Fountain Square, Columbus, OH 43224

Ohio was a garden occupied by Indians who lived in ecologic balance with their environment. White invasion soon changed the garden due to economic policies,population increase and wars. Sears' three stages of population growth relate growth to resource use and the need for conservation. Settlement, 1790-1850 was concerned with protection of settlers. Agricultural saturation 1850-1900, reflects influence of population increase and civil war on resource use. Neotechnical urban, 1900-to date, a time of scientific solution to problems, obviously not effective as polluted waters, exhausted soil and scarce woods and wildlife attest. Man's strong historic bond with wildlife makes it the leader of conservation movements. It helps sell less appealing resources and is the key indicator of resource health. Abundant wildlife is healthy resources. 100 years of wildlife conservation reveals that wildlife decline brought laws but little enforcement from 1829-1929. The Depression, drought and dust bowl brought dramatic recognition of conservation needs resulting in the golden age of conservation in Ohio and the nation. Protection alone didn't work; habitat management did until intensive row crop farming eliminated habitat. The nation needs new values and and policies. Control population and live in ecologic balance with resources. Bring back wildlife!

10:30 A HISTORY - ODNR'S DIVISION OF FORESTRY
Robert B. Redett, 7034 Rings Rd., Amlin, OH 43002; Ted Ford, Chief, Fountain Square, C-3, Columbus, OH 43224; Ed Parmer, Forestry, C-2, Fountain Sq. Columbus, OH 43224.

The Division predating the Department of Natural Resources by 64 years, was one of the original agencies merged into ODNR in 1949. Upon merger, it relinquished its forest-park system to the newly created Division of Parks and surrendered its forestry research function, which remained with the Division's parent organization, the Ohio Agricultural Experiment Station. Except for the preceding two items, the Division's basic mission as part of the Department remained the same as established by legislation in the early 1900s. It includes establishment and operation of state forests, forest fire protection, reforestation promotion and cooperation with federal agencies under which the Division provides technical assistance to forest industry, private landowners and communities through its various programs. A summary of accomplishments is represented by the following. Except for the orginal forest, the earliest base line data on Ohio's forest resource is a survey done in 1938-41; forest acreage 2,707,958, timber volume (bd.ft.) 9,357,958,000. 1977-78 forest acreage 7,120,100 timber volume (bd.ft.) 20,400,000,000. This remarkable change was due to the efforts of the Division and socio-economic forces. A major forest industry developed and forest game species: deer, turkey, grouse and beaver reappeared.

11:00 ODNR'S WATER AGENCIES
Sherman L. Frost, School of Natural Resources, The Ohio State University, Columbus, OH 43210; James R. Hanson, 50 W. Broad Street, Columbus, OH 43215; Robert L. Goettemoeller and William G. Mattox, Division of Water, ODNR, Fountain Square, Columbus, OH 43224

A succession of water agencies provided the nexus of forming the Division of Water in 1949. The Division's major objective through the years has been to collect, interpret, and share information on Ohio's water resources. It has studied droughts, floods, pollution, streamflow and ground water, helped map flood plains, inspected dams, built or financed reservoirs, made regional plans, studied Lake Erie coastal zone, cooperated with many agencies, counseled thousands, and produced many maps and reports. An advisory council was added in 1985. For the future: expanding work on coastal zone, ground water yields and safety, flood plain services, limiting water diversions, cooperative water plans, dam safety, streamflow studies, and computerizing water data. Chiefs of the Division: C.V. Youngquist, 1949-1970; Roy Winkle, 1970-1975; Wayne S. Nichols, 1975-1979; John H. Cousins, 1979-1983; Robert L. Goettemoeller, 1983-. The Ohio Water Commission was created in 1960 in ODNR to help coordinate water programs. It pioneered water planning and financing, and the framework for many new water laws and policies. It was abolished in 1972 with the creation of the Ohio Environmental Protection Agency.

11:30 A HISTORY OF ODNR'S DIVISION OF PARKS AND RECREATION Stan Spaulding, Chief, Russ Scholl. Asst. Chief, Ernest Gebhart, ODNR, Div. of Parks Fountain Square, C-3

Ohio State Parks began around 1825 when the Ohio canals and reservoir lakes were developed. The canals attracted fishermen, boaters and vacationers. Recreational interests increased and in 1895, the feeder lakes were dedicated for recreational use. Parks with scenic, cultural, historical or archeological significance were also developed from state forest lands and from wildlife areas beginning in 1922 with the acquisition of the Theodore Roosevelt game preserve in Scioto County.

The potential of these public facilities for an Ohio park system was brought to the attention of the Ohio Legislature in 1948. The result was Senate Bill 13 which created a unified Department of Natural Resources on August 11, 1949. The Division of Parks was created by this act and V.W. Flickinger was the first chief. During the ensuing four decades eleven chiefs have continued to administer programs that manage the Natural Resources and provide recreational opportunities.

12:00 Noon **Lunch**

1:30 A HISTORY OF ODNR'S DIVISION OF RECLAMATION
Tim L. Dieringer, Chief, Reclamation, Fountain Square, B-3, Columbus, OH 43224; Ernest J. Gebhart, 1414 Mulford, Columbus, OH 43212

Coal mining has taken place in Ohio for more than 180 years. During most of this period, the mining industry was unregulated and the effects of both underground and surface mining were widespread. The Division of Reclamation, created in 1949, is the regulatory agency which implements laws for the reclamation of lands affected by coal mining and surface mining of non-coal minerals. During 1986, coal production totalled 34.7 million tons and industrial mineral production totalled 80.5 million tons. Through its regulatory program, the Division enforces state mining and reclamation regulations, reviews permit applications, monitors bond adequacy, inspects mining operations, and ensures that proper and thorough steps are taken to restore mined lands to a productive state. Likewsie, the goals of the Abandoned Mined Lands (AML) program are to eliminate public health and safety hazards and correct environmental damages resulting from early mining which occurred during the period of unregulated coal mining and under less stringent mining laws. Funded by state and federal severance taxes from the mining of coal and industrial minerals, the AML program has reclaimed 8,941 acres since undertaking its first project in 1978.

2:00 OPEN COMMUNICATION POLICIES OF THE DIVISION OF OIL & GAS; J. Michael Biddison, Chief, Div. of Oil & Gas, Fountain Square, Bldg. A-3, Cols., OH 43224

The Division of Oil & Gas is the regulatory agency within the Ohio Department of Natural Resources responsible for overseeing oil and gas activities. It performs a dual mission to conserve Ohio's hydrocarbon resources and to protect other resources, such as freshwater, from the effects of oil and gas drilling, production and waste disposal. The key to the Division's regulatory scheme is a permit system which requires well owners to apply for legal authorization to initiate or alter any oil and gas operation. Within the Division, major programs dictate construction and performance standards for specific activities. The Underground Injection Control Program (UIC) issues permits for injection wells used for brine disposal, enhanced recovery and the solution mining of minerals. The Idle and Orphan Well Program finances the plugging of oil and gas wells that have been abandoned or are without legal owners. Research and Development conducts studies to assess the environmental impact of various brine disposal methods. The major focus of the Division is to enforce Ohio oil and gas laws and to work with the oil and gas industry to continually strive for safe resource recovery. Future strategies include developing "Implementation Plans" from mini-task force recommendations, expanding computer capabilities and intensifying public relation efforts to open communications.

2:15 OHIO'S SOIL AND WATER CONSERVATION PROGRAM
F. E. Heft, R.L. Christman, L.G. Vance, ODNR Fountain Square, E-2, Columbus, OH 43224

In 1941, the Ohio Soil and Water Conservation Committee was established to provide program development assistance and federal-state agency coordination to private landusers through locally organized soil and water conservation districts (SWCDs). Between 1942 and 1963, 88 county soil and water conservation districts were chartered as political subdivisions of the State. Gradually the agricultural program image broadened. Soil survey interpretations, develpment site evaluations, drainage improvement, flood and stormwater control, multiflora rose control, and tree and shrub seedling distribution programs were added. SWCDs were seen as contact points for natural resource management. In 1969, the committee merged with the Ohio Department of Natural Resources, became a commission and a Division of Soil and Water Districts was created. Educational, technical and financial assistance to groups and individuals increased. Agricultural and urban pollution abatement responsibilities were added to the program. In 1982, the Division merged with the ODNR Division of Land and Soils and the Resource Analysis Section of the Division of Water, creating the Division of Soil and Water Conservation, that could deliver basic natural resources data and capability/limitations interpretation assistance through local districts to benefit a variety of local agencies, groups of landusers, and individuals. Nonpoint source pollution control program responsibilities were added in 1987.

2:45 A HISTORY-O.D.N.R.'s DIVISION OF WATERCRAFT
Paul Gregory, Chief, Division of Watercraft, Fountain Square, C-2, Columbus, OH 43224

In 1959, the Division of Watercraft was organized within the Ohio Department of Natural Resources to register boats and fund capital improvement projects such as launch ramps and marinas. Since the inception of the Division of Watercraft, more than $30 million has been provided to political subdivisions for capital improvements to develop and maintain boating facilities. The Division also awards grants for marine patrols and watercraft educational programs to assist local communities and public agencies in enforcing watercraft laws and in developing safety awareness programs. Funding for the Division is provided by boat registration fees, 1/2 of 1% of the gasoline fuel tax, and federal grants. The issuance of Certificates of Titles and recording liens (mortages on watercraft and outboard motors) was initiated on October 11, 1963. In 1978, the Division developed the first river rescue program in the United States. Courses now offered include water rescue, river rescue, ice rescue, verticle rescue systems, and an aquatic victim rescue course for emergency medical and rescue personnel. In 1980, boat registrations were changed from annual to triennial renewal and a renewal-by-mail system was offered. In an effort to keep pace with the growing recreation boating industry in Ohio, the Division has steadily diversified and grown to more than 100 employees. Ohio now ranks seventh in the nation in the number of recreational boats. Over 367,000 boats were registered in 1987.

3:00 OHIO'S NATURAL AREAS & SCENIC RIVERS
R.E. Moseley, Chief, Div. of Natural Areas & Preserves, Fountain Square, Cols., OH 43224

With the passage of S.B. 345, the Scenic Rivers Bill in 1968 and Am. S.B. 113, the Natural Areas Act, on June, 1, 1970, the State of Ohio entered into a new program which not only provided for the protection of Ohio's scenic streams and unique natural areas, but provided for additional outdoor recreation opportunities for the citizens of the state. These acts authorized the Department of Natural Resources to administer a statewide system of nature preserves and scenic rivers and permitted the Department to acquire, dedicate and establish rules and regulations governing the use of the scenic rivers and nature preserves. Initially, little land was acquired and thus, management of these areas created no critical problems. However, as the acquisition of areas increased, it brought the management problem to the forefront. It soon became apparent that the management situation drastically needed to be altered if the Department was to adequately maintain and protect these unique natural areas and scenic rivers. Thus, on February 7, 1975, the Division of Natural Areas & Preserves was created by executive order to administer and manage the natural areas and scenic river systems. Over a year later, on June 2, 1976, the Division was created and established by law with the passage of H.B. 972. Today, the Division administers 10 scenic rivers encompassing 626 miles of streams and a system of 80 nature preserves with 15,900 acreas. In addition, the Division also administers the Ohio Natural Heritage, Endangered Plant, and Ginseng Management Programs.

3:15 DIVISION OF LITTER PREVENTION & RECYCLING
Bruce E. Mcpherson, Assistant Chief, Ohio Dept. of Natural Resources, Fountain Square, Building E-1, Columbus, OH 43224

The Office of Litter Prevention and Recyling was established in 1980 with passage of comprehensive litter control legislation. It was given Division status in 1987 along with other legislated program amendments. Its goal is to change littering behavior, reduce litter, and increase recycling of common household itesm. These goals are accomplished through a statewide program of awareness and education, improved litter law enforcement, Summer Youth Litter Corps roadside cleanup, increased litter containment and local litter prevention and recycling assistance. Six district assistance coordinators and a central office staff of 35 people currently implement the $10 million annual program budget, which is funded entirely by Ohio's corporations through additions to the corporate franchise tax. About 80% of the funds are passed through to local governments yearly in the form of grants for community litter prevention and recycling programs. Growth of the program has led to a greater emphasis on recycling because of its economic and environmental benefits. Recycling saves evergy and natural resources, contributes to the economy, and reduces the landfill space needed for waste disposal. Division Chiefs: Denise Franz King (1980-1982), Mary L. Wiard (1983-present).

3:30 OHIO DEPARTMENT OF NATURAL RESOURCES (ODNR): SUPPORT CLUSTER-PUBLIC INFORMATION & EDUCATION (PI&E)-FISCAL-ENGINEERING-OUTDOOR RECREATION-EMPLOYEE SERVICES-FLIGHT SERVICES-CIVILIAN CONSERVATION (CCC). Daniel R. Atzenhoefer, Ohio Department of Natural Resources, Fountain Square, Columbus, OH 43224

The genesis of Support Units, PI&E & Fiscal preceded ODNR's creation in 1949. PI&E began in 1914 with the sale of the State's first hunting license. It gained posture with the publication of the Conservation Bulletin in 1936. Factually informing and educating the public are its goals. Early fiscal responsibility/accountability were imperative for a viable and publicly acceptable organization. Engineering became a consolidated agency in 1962. Survey, design, inspection and maintenance of all ODNR's construction are major tasks. The responsibility for Shore Erosion was added to Engineering in 1961. Outdoor Recreation plans and designs recreation and real estate needs. Limited Employee Services had long existed; the genesis of today's agency in 1962 was finalized by executive order in 1971. Its responsibilities are employment, employee benefits, and other related services. Flight Services serves law enforcement, fire control, land capability, land reclamation, and other activities. Civilian Conservation, created in 1977, performs essential conservation work for ODNR agencies and communities by employing persons 16-23 years of age. Future strategies are postured for change and progress to meet the needs of the times and legislative/administrative demands. Public trust and service will always be first.

4:00 **Response**

SYMPOSIUM - GEOGRAPHY IN PRE COLLEGE EDUCATION IN OHIO
Room 68 Hopewell Hall
Friday, April 29, 1988 - 7:30 to 9:00 p.m.
Leonard Peacefull, Presiding

In recent months the lack of Geographic knowledge of our high school students has received nationwide media attention. Newspapers have carried horror stories about students failing to recongize the United States on a map, Viet Nam being an island in the Pacific Ocean and many other similar instances. Last year Congress decreed November 15th - 21st to be Geography Awareness Week, in an attempt to make the country more aware of the need for a sound geographic education. At the same time leading organizations, in the nation, have taken up the challenge to improve our student's geographic knowledge. The Geographic Education National Implementation Project (GENIP), a joint venture of: the Association of American Geographers (AAG), the National Geographic Society (NGS), the National Council for Geographic Education (NCGE), and the American Geographical Society (AGS), has as its goal the improvement in the quality and status of geographic education in grades K-12. The NGS's Geography Education Foundation has been established to distribute funds to help support public-service activities, such as State Geography Alliances. The AAG recently received a grant to improve the quality of teacher preparedness in Geography. These are nationwide projects, the question remains what can we do in Ohio. The symposium on Geography in Pre College Education in Ohio will focus on the issues, the problem as it exists in the State today, and direct our attention towards a possible solution. That solution being a greater involvement, by university departments, in how our future teachers are trained in the discipline and by interacting with local schools in developing programs which will eventually overcome the student's geographic deficiency.

SPEAKERS

Leonard Peacefull, Vice President, Geography Section, The Ohio Academy of Science. Introduction and Overview of the Problem.

Lathardus Goggins, Associate Professor, Department of Geography, University of Akron. The Perception of Geography in Our High Schools - A Case Study of Akron City Schools.

Antony DeSouza, Office of the President, National Geographic Society, Washngton, D.C. The National Geographic Society Geography Alliance Scheme.

Fred Walk, Normal Community High School, Normal, IL. Operating a Geography Alliance.

W. Randy Smith, Associate Professor, Department of Geography, Ohio State University. Establishing a Geography Alliance in Ohio.

Ronald Abler, National Science Foundation, Washington, D.C. How the National Science Foundation Can Be of Assistance.

SECTION A. ZOOLOGY
Morning Session - Room 2108 Founders Hall
Saturday, April 30, 1988
James Brooks, Presiding

9:00 NEW DISTRIBUTIONAL RECORDS OF CAMBARUS (JUGICAMBARUS) DUBIUS FAXON AND C. (J.) MONONGALENSIS ORTMANN (DECAPODA: CAMBARIDAE). G. Whitney Stocker, 13773 Bodle Rd. NE and Raymond F. Jezerinac, The Ohio State University, University Dr., Newark, Ohio 43055.

Cambarus (J.) dubius and C. (J.) monongalensis, which are primary burrowers, are not restricted to drainage basins. Therefore, new county records are appropriate to describe their distributions. The new records expand the range descriptions for these species as reported by Ortmann (1906,1931) and Hobbs (1969,1974). The range of C. monongalensis extends farther south and east in West Virginia and is a new state record for Virginia. Records are from Doddridge, Greenbrier, and Tucker Counties in West Virginia, and Highland County, Virginia. The range of C. dubius is extended to the south shore of the Ohio River in West Virginia and northeastern Kentucky, and to the western edge of the Cumberland Plateau. Records are from Cabell, Clay, Kanawha, Lincoln, Mason, Mingo, and Putnam Counties in West Virginia, Campbell and Fentress Counties in Tennessee, Carter, Casey, Greenup, Johnson, Laurel, Lawrence, Lewis, McCreary, Menifee, Morgan, Pike, Powell, and Wolfe Counties in Kentucky.

9:15 EFFECTS OF A LOW OP DOSE ON SEED/BEAD DISCRIMINATION IN THE KANGAROO RAT (DIPODOMYS) *Tony J. Peterle, Dept. Zoology, Ohio State Univ. 1735 Neil Ave., Columbus, Ohio 43210*

Wild-trapped Merriam's kangaroo rats (D. merriami) were acclimated to the laboratory for 2 weeks prior to testing their ability to discriminate between equal numbers of seeds (hulled rye Secale cereale) and beads (oat pearls). After a 5-minute exposure to the seed/bead mixture, the rats were anesthetized with Metofane, their cheek pouches emptied and the seeds/beads counted. Twenty-two rats were ranked according to their ability to discriminate between seeds and beads and paired. One member of 11 pairs was randomly selected to be gavaged with 5mg/kg of the organophosphate methyl parathion(O,O-dimethyl-O-4-nitrophenyl phosphorothioate). Twelve and 24 hours later, rats were tested for their ability to discriminate. Treated animals selected fewer beads compared to control animals (Chi-square=17.76, df 1,P<0.01). There was no difference pre- and post-treatment in the rats selection of seeds (Chi-square=0.05,df 1,P>0.10). Paired t-tests were not significant. The number of seeds and beads picked up in the 5-min test over 8 trials averaged 0-54.3 for seeds and 0-6.2 for beads per trial. The parathion dose resulted in a slight depression in ChE levels; two control animals had activity levels of 92.3 and 98.1% and two treated animals 75.5 and 77.2%. Treatment with one-half the LD_{50} laboratory rat dose of methyl parathion apparently produced a hormesis effect on the rat and enhanced their ability to discriminate between seeds and beads.

9:30 CONSPECIFIC TOLERANCE OF BLARINA BREVICAUDA SAY DURING A REDUCTION OF FOOD AVAILABILITY. Karen S. Ausdenmoore, Department of Biological Sciences, University of Cincinnati, Ohio 45221

The semifossorial insectivore, Blarina brevicauda, is one of the most common mammals in the eastern portion of North America. Merriam's (1886) classic experiment of placing three Sorex under a glass tumbler, where upon one shrew killed and devoured the other two, reflects the general consensus of soricidae's tolerance of conspecifics. The consensus was that shrews are extremely aggressive and highly territorial.

The findings of my study indicates that Blarina is more tolerant of conspecifics than formerly believed. Agonistic behavior was high at the start of the experiment, but after a period of acclimation to the test enclosure and to each other, agonistic behavior decreased sharply. The effect of a reduction of food availability on conspecific tolerance was also examined. Tolerance did not decrease until the reduction reached 50+ percent of the combined body weight of the paired shrews. At 50+ percent reduction, agonistic encounters became more frequent suggesting that food availability is a key factor in Blarina's tolerance fo conspecifics.

9:45 HABITAT SELECTION OF ICHTHYOMYZON FOSSOR AND LAMPETRA APPENDIX IN A NORTHEASTERN OHIO STREAM. Anne A. Anderson and Andrew M. White. Biology Department, John Carroll University, University Hts., Ohio 44118.

The importance of sediment composition, current velocity and water depth to the habitat selection of two endangered ammocoetes, I. fossor and L. appendix, was examined in Trumbull Creek, Ashtabula Co., Ohio. A comparision of occupied and unoccupied habitat demonstrates that median particle size and heterogeneity are important factors ($p<0.0001$) in habitat selection by both species. Within habitats occupied by the two species, significant differences ($p<0.05$) were found in current velocity, water depth, sediment silt and total volatile solids content. No significant differences ($p<0.05$) were evident for median particle size or sediment heterogeneity. Maximum silt content of occupied sediments are 51% (appendix) and 77% (fossor). Maximum total volatile organic content is 21% and 65% respectively. Small I. fossor ammocoetes are significantly less tolerant of silt than large ones. L. appendix are less tolerant of silt or organic content, than I. fossor.

10:00 ACTION OF MALATHION ON THE GILLS OF BLUEGILL SUNFISH, LEPOMIS MACROCHIRUS. Chelliah Richmonds and Hiran M. Dutta, Department of Biological Sciences, Kent State University, Kent, OH 44242

Effects of exposure to a sub lethal concentration of malathion (0.05 ppm) for varying periods on the gills of bluegill sunfish was investigated in this study. After 24 hours of exposure the lifting of the gill epithelium and interlamellar degeneration were observed. As time progressed, lamellar fusion and lamellar aneurism were noticed. These damages result in hypoxia and respiratory failure leading to death. The deterioration of respiration might be accompanied by a similar deterioration in the osmoregulatory mechanisms of the fish since gills take part in both the mechanisms. The extent of damage to the gill tissues is dependent on the concentration of the insecticide and duration of exposure.

10:15 DIFFERENTIAL RESPONSES OF THE FISH G.I. TRACT AND TRACT APPENDAGES TO STARVATION. Amjad Hossain and Hiran M. Dutta, Department of Biological Sciences, Kent State University, Kent, OH 44242

The responses of digestive tract and tract appendages to starvation were analyzed. The contents of stomach, caeca and intestine were measured in 55 wild and 35 starved (week long) bluegills. Two bluegills were forced to starve and another two were regularly fed in laboratory for 50 days. The histology of G.I. tract of starved and fed bluegills were compared. The fasted bluegills accumulated 26.5%, 16% and 57.5% of the entire G.I. tract content in stomach, caeca and intestine respectively compared to 31.5%, 7.5% and 61% respectively of wild bluegills. There were 77%, 38% and 69% reduction in stomach, caeca and intestine contents respectively due to fasting. When the post-stomach content was compared, percentagewise the caeca stored twice more in starving condition than in wild. The caeca varied among themselves in storing different amount of food. However a consistent pattern was noticed in both the cases. Starving exerted more prominent influence on the intestinal tissues when compared to that of caeca. The intestine was heavily infested with parasites. The muscle became thinner. The submucosa and mucosa were also greatly modified. The histology of caeca of starved fish was not much different from that of fed ones. The appendages were more conservatory and resistant to starvation than the main tract.

10:30 OTTAWA RIVER FISH COMMUNITIES: 1893 TO 1987. Randall E. Sanders & David J. Altfater. Ohio EPA, 1030 King Avenue, Columbus, Ohio 43212

Fish surveys conducted in the Ottawa and Auglaize Rivers since 1893 document historic changes and long term trends in fish communities within a 83.2 km stretch extending from

upstream of Lima downstream to Cloverdale, Ohio. Seines were used to collect qualitative data during all years except 1979, 1985, and 1987 when standardized electrofishing was used to collect quantitative relative abundance and biomass data. Results over this 94 year period revealed that discharges of industrial and municipal wastewater have had a marked negative impact on fish communities within and downstream from Lima while upstream communities have remained stable. Impacts from dischargers were greatest during the 1960s when more than 60 km of the rivers were devoid of fish. Negative impacts declined with improved wastewater treatment after the enactment of the 1972 amendments to the Clean Water Act. Fish returned to the mainstems by 1976 and species richness consistently increased thru 1985. Using electrofishing data collected during 1979 and 1985, two biological indices (Index of Biotic Integrity and Modified Index of Well-Being) also showed recovering communities. Recovery, however, was not complete during 1985 as shown by below-expected index values and a high number of external anomalies on fish. 1987 results were similar to 1985 and suggest that further improvements in discharges are still needed for full recovery and compliance with goals of the Clean Water Act.

SECTION A. ZOOLOGY
Afternoon Session - Room 2108 Founders Hall
Saturday, April 30, 1988
Paul Stromberg, Presiding

1:30 SECTION BUSINESS MEETING

2:00 THE FISHES OF THE FLUSHING ESCARPMENT. Roger F. Thoma and Paul S. Albeit. OEPA 1030 King Avenue, Columbus, Ohio 43212.

Fish collections (using electrofishing techniques) have been made at a total of 145 sites within the Flushing Escarpment in Ohio. The stream basins of Little Beaver (45 sites), Yellow (19 sites), Cross (22 sites), Short (3 sites), Wheeling (5 sites), McMahon (13 sites), Captina (17 sites), and Sunfish (13 sites) Creeks have been sampled by the Ohio EPA between the years of 1982 and 1985. A total of 69 fish species and eleven hybrids were collected. Numerous distributional changes have occurred within the study area when compared with Trautman (1981) data. Much of this dynamics is due to environmental changes within the area of study, while others are due to variations in sampling intensity and methods. Selected distributions are presented to highlight these changes within the Flushing Escarpment.

2:30 COMMUNITY AND ENVIRONMENTAL FACTORS ASSOCIATED WITH NATURALLY OCCURRING HYBRIDS BETWEEN NOTROPIS CHRYSOCEPHALUS AND NOTROPIS RUBELLUS (CYPRINIFORMES: CYPRINIDAE). Roger F. Thoma and Edward T. Rankin. OEPA, 1030 King Avenue, Columbus, Ohio 43212.

Collections throughout the State of Ohio of N. chrysocephalus/N. rubellus hybrids with environmental and fish community data have revealed that this naturally occurring hybrid does not conform to traditional explanatious of hybrid inducement. To explain the occurrence of these hybrids, Trautman (1981:124) implicated environmental instability due to high gradients in streams. Our data indicate that though gradient may be a factor in Ohio a stronger correlation exists between the presence of Nocomis biguttatus or Nocomis micropogon populations and the parent Notropis species. Hybrid individuals are confined almost exclusively to the cleanest, most undisturbed streams of Ohio where populations of the two parent Notropis species and at least one Nocomis species are common.

2:45 RELATIONSHIPS OF THE CYPRINID GENUS HYBOGNATHUS Ted M. Cavender and Miles M. Coburn. Ohio State University, Columbus, Ohio 43210 and John Carroll University, Cleveland, Ohio 44118.

Phyletic position of the enigmatic genus Hybognathus has not been previously demonstrated although the long coiled intestine and herbivorous diet have been used to group Hybognathus with Dionda and Campostoma among North American genera. The morphological analysis that we have completed supports this arrangement and has shown there is a mosaic distribution of derived characters found within these three genera which are almost all associated with the cropping and mechanical processing of algae. Each has evolved unique features in this area. For example, Hybognathus has modified the soft tissues of the pharynx to form an accessory filtering mechanism to the gill rakers while the two forms of Rio Grande Dionda have developed a cartilaginous edge to the upper gnathic rami that occludes with the cartilaginous rim of the lower jaw. Campostoma is well known for its hypertrophied cartilaginous scraper on the dentary. The pattern of shared derived characters of the feeding mechanism suggests Hybognathus is sister to a group composed of Dionda and Campostoma.

3:00 EVIDENCE FOR TISSUE SPECIFIC REGULATION OF ECDYSONE 20-MONOOXYGENASE ACTIVITY IN AEDES AEGYPTI. Stan L. Smith and Martin J. Mitchell. Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Ecdysone 20-monooxygenase (e-20-m) is the insect cytochrome P-450 dependent steroid hydroxylase that converts ecdysone to the more active hormone 20-hydroxyecdysone. Using a radioassay, the activity of e-20-m and the factors which may regulate this enzyme were examined in female Aedes aegypti during early adult life and the gonadotropic cycle. Total abdomen e-20-m activity was found to increase ~8 fold from days 1 to 3 post adult eclosion and remain at this elevated level in non-blood fed females for several days. Blood feeding elicited dramatic and tissue specific fluctuations in this basic profile of e-20-m activity. In abdomens or gut complexes, the e-20-m activity was found to drop ~8 fold by 24 hr post blood meal, whereas the e-20-m activity in fat body-body wall complexes was found to increase ~4 fold by 24 hr post blood meal. Enzyme activities in both tissue complexes returned to their prior levels by 48 hr post feeding. The drop in gut e-20-m activity was found to occur in association with transferable, blood-induced, phenylmethylsulfonyl-fluoride-resistant gut factors which inhibit steroid hydroxylase activity. The increase in fat body-body wall e-20-m activity, however, was found to require a blood induced head factor(s) released between 8 and 16 hr post feeding. Supported by NIH (AI20604), OBOR, FRC and Sigma Xi Grants.

3:15 THE PLECOPTERA OF NORTHEASTERN OHIO. Martin A. Tkac Jr. 1768 Amherst Street, East Cleveland, Ohio 44112.

Fifty-four species of Stoneflies (Plecoptera) comprising 24 genera and 9 families were collected from a 14 county area in northeastern Ohio during a period extending from 1975 to 1979. Adults were collected for positive identification to species from approximately 100 sites. Methods for collection of material included hand-sweeping, examination of stream-side vegetation and substrate, and the use of a "black-light" in conjunction with a five foot square white sheet. The systematic arrangement and nomenclature follows that of Zwick (1973). The estimated flight period, local distribution, relative abundance and prominent ecological factors are noted.

SECTION A. ZOOLOGY
Poster Session - Adena Gym
Saturday, April 30, 1988

Board A @ 9:00 a.m. SURVEY OF NITIDULID BEETLES COLLECTED IN RURAL WAYNE COUNTY. Roger N. Williams and Daniel S. Fickle, Department of Entomology, Ohio State University, Ohio Agricultural Research and Development Center, Wooster, OH 44691, U.S.A.

Nitidulid beetles are pests of ripe strawberries, raspberries, sweet corn and other fruits and vegetables. They are nuisance pests and contaminants of food at picnics and other outdoor festivities. They are also well known for their ability to act as disease vectors, and beneficial organic decomposers, as well as predators and pollinators.

Over the past several years, food attractants and artificial chemical lures have been tested as a means of monitoring the natural populations of nitidulid beetles in a rural farm situation. These tests have measured seasonal activity and abundance of the five nitidulids. The better attractants tested were banana, whole wheat bread dough, butyl acetate, and arid propyl propionate. Numbers of beetles collected for each attractant are given by week from April through October. Results yielded valuable information on the seasonal start of individual species activity, population peaks and duration of seasonal activity.

Board B @ 9:00 a.m. EARLY SEASON CONTROL OF FOLIAR GRAPE PHYLLOXERA, DAKTULOSPHAIRA VITIFOLIAE (FITCH) (HOMOPTERA: PHYLLOXERIDAE) Murdick J. McLeod and Roger N. Williams, Dept. of Entomology, Ohio State University, Ohio Agricultural Research and Development Center, Wooster, OH 44691, U.S.A.

The grape phylloxera, Daktulosphaira vitifoliae, is an aphid-like insect of worldwide distribution. It occurs in two distinct forms, one attacking the foliage and the other attacking the roots with intermediate stages between the root and foliar forms. A diagram depicting the seasonal cycles will show damage symptoms caused by this homopterous insect.

In Ohio and eastern North America, the native home of this insect, the major problem is leaf galling caused by the foliar form. Control has typically been directed at this form at bloom or following bloom. In recent years, we have been experimenting with earlier control in order to stop the ravages of this pest before populations have a chance to multiply. Results obtained with the following insecticides: endosulfan, talstar, fenvalerate, cyfluthrin, fenpropathrin, esfenvalerate, and phosalone, and their utility are discussed.

Board C @ 9:00 a.m. OVERWINTERING BIOENERGETICS OF THE FREEZE TOLERANT GALL FLY. Robyn A. Dommel and Richard E. Lee, Jr., Department of Zoology Miami University, Oxford, Ohio 45056

In preparation for overwintering, insects accumulate energy reserves primarily in the form of lipids and, to a lesser extent, glycogen. Although it has received scant attention in the scientific literature, an important bioenergetic factor in overwintering survival is the controlled use of stored energy reserves. The goldenrod gall fly, Eurosta solidaginis (Diptera: Tephritidae), overwinters inside stem galls on goldenrod, Solidago spp. as a freeze tolerant third instar larvae. The rate of energy utilization may be determined by measuring the rate of oxygen consumption. In a laboratory study, third instar larvae were acclimated for four months to three conditions: constant +5 C, constant -15 C, or cycled from +5 to -15 C every 3 weeks. Immediately after thawing, frozen (-15 C) larvae exhibited a significantly lower respiration rate (93.8 ± 14.2 ul O_2/mg/hr) than the unfrozen (+5 C) larvae (154.8 ± 5.8 ul O_2/mg/hr). The cyclically transferred group showed an intermediate level of consumption. Respiration rates remained essentially constant within each group throughout the duration of the experiment.

Board D @ 9:00 a.m. HOUSE FLY COLD TOLERANCE: SUPERCOOLING CAPACITY AND LOW TEMPERATURE SURVIVAL OF MUSCA DOMESTICA L. J.M. Strong-Gunderson and R.A. Leopold* Department of Zoology, Miami University, Oxford, Ohio 45056 and *USDA Metabolism and Radiation Research Laboratory, Fargo, N.D. 58105.

The house fly Musca domestica L. is a freeze susceptible insect that does not tolerate tissue freezing during any developmental stage. The supercooling points of embryos, larvae, pre-pupae, pupae and adults were determined and found to range from -32.6C for two-hour-old embryos to -14.5C for pre-pupae. Significant differences among and within developmental stages were observed. LT-50's of the five developmental stages were determined at temperatures of 10, 5, 0 and -5C. It was found that for temperatures at and above 0C pupae were the most tolerant while at -5C ten- and twelve-hour-old embryos were the most tolerant. It was determined that low temperature survival of this insect does not extend to the super-cooling point but instead to a temperature near 0C. It appears that the developmental stages which would be the most likely to be exposed to sub-zero ambient temperatures are the best equipped to deal with this condition.
This research was jointly funded by North Dakota State University, Fargo, N.D. and the Agricultural Research Service of the US Department of Agriculture, Cooperative agreement #58-519B-1-974

Board E @ 9:00 a.m. **AN OBJECTIVE METHOD FOR RANKING THE GENERAL TOLERANCE AND INTOLERANCE OF STREAM FISHES. R. F. Thoma, E. T. Rankin, M. A. Smith and R. E. Sanders. OEPA, 1030 King Avenue, Columbus, Ohio 43212**

The presence or absence of a fish species has frequently been used to assess environmental conditions in streams. The methods of ranking taxa tolerance are usually subjective and include a reliance on historical changes in distribution, laboratory toxicity test, life history studies, and general field observations. We propose a method for ranking the tolerance of Ohio stream fishes using relative abundance data from over 2,000 sites sampled with standardized electrofishing techniques. For each site at which species "A" occurs, a community value exist, either the IBI (Index of Biotic Integrity, Karr 1981) and/or a modified Iwb (Index of well-being, Gammon 1980). We have used these values in the following calculation: Σ(IBI (or Iwb) X N (at site 1 . . .n))/ ΣN = the weighted mean of species A where N = the numer of individuals of species A per unit distance. This weighted mean represents the relative level of tolerance. This assumes that a more intolerant species reaches its greatest abundance at undisturbed sites (which display high species diversity and richness). When calculated for all Ohio species the most intolerant species will have the highest weighted mean. Species rankings (using IBI and IWB) are compared. This method makes environmental assessment move sensitive and reproducible and can be applied to other taxa in other regions where relative abundance data exists.

SECTION B. PLANT SCIENCES
First Morning Session - Room 2096 Founders Hall
Saturday, April 30, 1988
B. Andreas, Presiding

9:00 20 YEARS OF FIELD RESEARCH (1967-1987): THE RARE AQUATIC-WETLAND VASCULAR PLANTS AT EAST HARBOR STATE PARK, OTTAWA COUNTY, OHIO. Ronald L. Stuckey, Department of Botany, The Ohio State University, Columbus, OH 43210.

Nearly 40 rare aquatic-wetland species, representing about 20% of the Park's total wetland flora (200 species), have been located. These rare species are maintained here because of the sand substrate, naturally distributed through the action of changing Lake Erie water levels and the continued action of wind, waves, and ice. Since becoming a State Park in 1946, the site has been physically disturbed by the building of roads and parking lots and the dredging of marshland for a large boat harbor. Major dredging of the substrates was completed in the summers of 1968 and 1982, resulting in considerable shifting of the substrates. Many rare species then appeared for the first time on the new wet substrates. Their appearance can be attributed to at least two sources: (1) viable seeds in the seed bank, or (2) invasion from nearby areas. Some species, once much more common, are now rare because of man's actions. The great aquatic-wetland species diversity here should be acknowledged as one of the prime small natural sites still remaining along the south shore of Lake Erie. Efforts to maintain this diverse flora through natural or managed disturbance must be continued to insure its protection. A list of the plants will be available at the meeting.

9:15 THE FLORA OF THE GLACIATED ALLEGHENY PLATEAU REGION OF OHIO. Barbara K. Andreas. Cuyahoga Community College, Cleveland, Ohio 44122.

Between 1976 and 1986, field and herbarium surveys were conducted in order to compile a vascular plant flora of the Glaciated Allegheny Plateau region of Ohio. Occupying about 1/4 of the state, the study area encompasses all of seven counties and parts of 16 other counties. The flora of the Glaciated Allegheny Plateau region includes 2,002 species and 27 interspecific hybrids belonging to 705 genera and 148 families. Approximately 75% of the taxa are native and 25% are alien. One hundred forty-nine of the taxa are, in Ohio, more or less confined to the Glaciated Allegheny Plateau region. Of these definitive or indicator taxa of this phytogeographical region, 50% occur in wetlands, especially peatlands. Another 18% are confined to hemlock-white pine-hardwood communities. Seven percent occur on eroding slopes found where post-Pleistocene streams have cut through lacustrine deposits and shales. The remaining 25% of these definitive or indicator taxa grow in various types of plant communities. Thirty-two of these taxa are listed as extirpated from Ohio.

9:30 EUPHORBIA PURPUREA (RAF.) FERNALD EXTANT IN OHIO. Jeffrey D. Knoop, The Nature Conservancy, 1504 W. 1st Ave., Columbus, OH 43212

Euphorbia purpurea, a large (0.5 - 1.0 m) herbaceous perennial of the family Euphorbiaceae, historically was known from one station in Ohio where it was collected in 1921 and 1924. In 1987, this species was rediscovered in southern Pike County, Ohio, on a dry, wooded slope. This

new population, numbering 300 stems, is disjunct by 300 km from the nearest known population in eastern West Virginia. The species may have migrated into southern Ohio via the pre-glacial Teays River System.

Throughout its range, Euphorbia purpurea is known from 29 stations, mostly occurring at high elevations in the Appalachian Mountains from North Carolina to Pennsylvania. Formerly listed as extirpated from Ohio by the Ohio Natural Heritage Program, Euphorbia purpurea currently is under review by the U.S. Fish and Wildlife Service as a possible candidate for listing as a federally threatened or endangered plant species.

9:45 POLLINATION ECOLOGY AND EVOLUTION OF PEDICULARIS (SCROPHULARIACEAE). Lazarus Walter Macior, Department of Biology, The University of Akron, Akron, Ohio 44325.

A 20-year study of pollination dynamics in Pedicularis indicates that the genus is highly coadapted with bumblebees (Bombus), its primary pollinators. Pollination of all species experimentally studied is insect-dependent. Flower color as an insect attractant is coordinated with bumblebee spectral vision. Floral mechanisms are intricately adapted to foraging behavior of pollinators. Phenology of anthesis is related to foraging differences of insect castes and to the seasonal development of annual bumblebee colonies. A comparison of North American, European, and Asiatic floral mechanisms reflects convergent, divergent, parallel, and reticulate evolution. Geographic distribution of the genus, coupled with pollination dynamics, indicates a probable origin of the genus in the Himalaya with subsequent migrations throughout the Palearctic and trans-Beringian expansion into the Nearctic, where uncommon secondary adaptations to bird and solitary bee pollinators occur. Lepidopteran pollination is suspected in floral mechanisms with extremely long tubes yet to be studied in the Himalaya. While limited studies of Pedicularis isozymes have identified genetic uniformity in local populations and endemic species, current investigations involving DNA-restriction mapping should yield substantial information on derivative relations of sympatric species.

10:00 INFLUENCE OF SEEDBANKS ON EARLY SUCCESSIONAL VEGETATION IN RECENT CLEAR-CUT PINE PLANTATIONS IN SOUTHERN OHIO. Francisco J. Artigas and Ralph E.J. Boerner, Environmental Biology Program and Department of Botany, The Ohio State University, Columbus, Ohio 43210.

As part of our continuing study of the ecological fate of senescing CCC-era pine plantations in Hocking County, Ohio, we compared the germinable seedbanks of six active pine plantations to the early seral flora of six 1-4 year old neighboring clear-cuts. The seedbanks of the active plantations were dominated by annual and perennial herbs; the few common woody species included Acer rubrum, Rhus radicans, Parthenocissus quinquefolia, and Vitis spp. The diversity of germinable seeds in the seedbank decreased with plantation age, and far fewer germinable seeds were found in the mineral soil than in the overlying pine litter layer. Recent clear-cuts were dominated by wind and bird dispersed shrubs and pioneer trees including Rhus glabra, R. typhina, Aralia spinosa, Rubus spp., and Liriodendron tulipifera. Only Sassafras albidum was common in both clear-cuts and seedbanks. Community composition in recent clear-cuts was independent of the species of pine which formerly occupied the site and both topographic and edaphic features. We conclude that the seedbank does not greatly influence the early stages of stand development in these sites.

10:15 ANALYSIS OF RATE AND PATTERN OF TREE INVASION ON BUFFALO BEATS, A PRAIRIE OPENING IN SOUTHEAST OHIO. ORTT,Marilyn, 701 Colegate Dr., Marietta, OH 45750

Buffalo Beats is a $<\frac{1}{2}$ ha tall grass prairie completely surrounded by mixed oak woods located on a clay lens on a ridge in Athens Co., OH about 90 km. from the nearest known similar community-type. A quantitative study by Dr. Warren Wistendahl in 1962 repeated by Dr. Dennis Hardin in 1984 showed both area and species richness were being reduced. Quercus spp. were the most common successful invading trees and were concentrated around the edge forming a gradation between the second-growth woods and the small opening where prairie species were dominant. A management plan to reverse the encroachment of trees included cutting invading trees. Historical records as well as stumps ≥ 8 cm. in diameter at the base were examined to obtain information about fire history and patterns of both tree growth and advance of trees into the prairie. Fifteen of the 97 trees were 49-54 years old and were distributed uniformly around the perimeter. The rest of the cut trees were younger with the exception of 1 that was 78 years old. All trees less than 31 years of age were concentrated on the western edge. Since the site is a proposed Research Natural Area in the Wayne National Forest further information about the history of this site is important.

10:30 THE EFFECTS OF SALINITY, TEMPERATURE AND STORAGE CONDITIONS ON THE GERMINATION OF HORDEUM JUBATUM L. Kemuel Badger and Irwin Ungar. Department of Botany, Ohio University, Athens, Ohio 45701.

The dormancy and environmental control of the germination of Hordeum jubatum L. were investigated. Hordeum jubatum is a short-lived perennial that is typically found on moderately saline soils. This study was conducted with a population of H. jubatum occurring on an inland saline pan near Rittman, Ohio.

Seeds of H. jubatum mature and are released in the early summer, but do not germinate until fall or the following spring. Summer temperatures inhibit the germination of H. jubatum even under favorable moisture conditions. Seeds show no innate dormancy and will germinate immediately after dispersal if exposed to a favorable temperature regime. Germination rate and percentage are negatively correlated with increasing salinity above 0.5% NaCl. The germination response of seeds stored under different conditions varied significantly.

10:45 DEMOGRAPHIC STUDIES WITH ECHINOCHLOA CRUSGALLI ALONG A SALINITY GRADIENT. Marlis Rahman and I.A. Ungar. Department of Botany, Ohio University, Athens, Ohio 45701.

To determine the survival percentages of Echinochloa crusgalli populations exposed to salinity stress and biotic stress, field observations were conducted in a saline wetland in Washington County, Ohio from 1985 to 1987. Three locations were studied along a salinity gradient, using 100 10 x 10 cm plots. Survivorship of E. crusgalli was observed once each week during the growing season. To determine the effect of competition on survival of E. crusgalli, 25 plots were cleared of all other species. Fluctuation in soil salinity was measured weekly using 9 soil conductivity sensors, three per location. Mortality risk at all sites was high throughout the growing season. Among uncleared plots, the low salinity area had the highest survival percentage (15.9%). Competition caused a reduction in percentage survivorship. In 1985 the reduction in survivorship due to competition was 35.6% while in 1986 it was 36.8%. Survivorship curves for E. crusgalli in these saline habitats appear to fit a Deevey type II curve.

SECTION B. PLANT SCIENCES
Second Morning Session - Room 2090 Founders Hall
Saturday, April 30, 1988
L.A. Kapustka, Presiding

9:00 EFFECT OF HIGH TEMPERATURE STRESS (HTS), ACC AND METHIONINE ON PEROXIDASE ACTIVITY IN TWO ISOLINES OF MAIZE. M. Akhtar and M. O. Garraway, Department of Plant Pathology, Ohio Agr. Res. Dev. Center, and The Ohio State University, Columbus, OH 43210.

Detached leaves from two isolines of maize (Zea mays L.) which differed in their susceptibility to disease caused by the fungal pathogen Bipolaris maydis race T were incubated for 6h in the dark at 42C (HTS) then for another 24h or 48h at 28C in the dark. Controls were continuously incubated at 28C in the dark. Peroxidase activity in the susceptible isoline exposed to HTS was significantly higher than in the resistant isoline similarly exposed. Peroxidase activity increased more in the susceptible than in the resistant isoline when detached leaves were floated on a solution containing 10 ppm 1-aminocyclopropane-1-carboxylic acid (ACC) or 50 ppm methionine, chemicals involved in ethylene biosynthesis, for 24h or 48h at 28C in the dark. Also, when ACC-or methionine-treated tissues were subjected to starch gel electrophoresis, cathodic isozymes of peroxidase increased more in the susceptible than in the resistant isoline. The increased level of peroxidase in the susceptible isoline in response to HTS could involve the accumulation of ACC and methionine. Alternatively, the HTS-treated susceptible isoline may have greater sensitivity to the accumulation of these chemicals.

9:15 DEVELOPMENT OF A POLYCLONAL ANTIBODY-BASED SERODIAGNOSTIC ASSAY FOR DETECTION OF XANTHOMONAS CAMPESTRIS PV. PELARGONII IN INFECTED GERANIUM PLANTS. Anderson, M. J. and Nameth, S.T., Graduate Research Assistant and Assistant Professor, Department of Plant Pathology, The Ohio State University, 2021 Coffey Road, Columbus, OH 43210.

Polyclonal antiserum was produced by immunizing female New Zealand white rabbits with a saline washed suspension (~1.0 x 10^9 c.f.u./ml) of X. camp pv. pelargonii. Antisera titer was determined using an indirect enzyme-linked immunosorbent assay (ELISA) in a multi-well format. Raw unpurified antisera with a titer of 1/8000 was used to develop an immunoblot assay for detection of X. camp pv. pelargonii in infected geranium plants. Stem and petiole pieces excised from symptomatic and asymptomatic plants were soaked in 100 ml of sterile distilled water for 10 minutes after which 2 ml were removed and spotted onto nitro cellulose membrane. Non spotted sites were blocked and the membrane was exposed to an antisera solution (dilution 1/8000) for 1½ hours. After washing, the membrane was exposed for 2 hours to a solution containing gold-conjugated goat-antirabbit antibodies. After washing a silver enhancement solution was added allowing for color development. Positive results produced a black color on spots containing X. camp pv. pelargonii, negative results produced no color. Results indicate a rapid and sensitive technique for detection of X. camp pv. pelargonii in infected geranium plants.

9:30 SURVIVAL OF BACILLUS SUBTILIS IN ACER SACCHARUM LINERS. T. J. Hall and W. E. Davis, assistant professor and horticulturist, respectively. Tennessee Technological University, School of Agriculture, Box 5034, Cookeville, TN 38505.

An isolate of Bacillus subtilis marked with resistance to the antibiotic Rifampicin was inoculated into stems of 20 two-year-old liners of Acer saccharum using a serum cap-stem wound technique. Five non-inoculated controls were included in the study. Trees were in full leaf at the time of inoculation and were incubated under ambient conditions and harvested the following spring in full leaf. Harvested stems were debarked, cut serially into 2 cm long sections, and frozen at -20 C. Sections were surface sterilized by immersing in boiling water for 3 sec and cultured at 24 C on media ammended with 100 ppm of (3-[4-Methylpiperazinyliminomethyl]rifamycin sv) (Rifampicin) and 5 ppm of 2,3,5-triphenyltetrazolium chloride. Bacterial colonies resembling B. subtilis were gram stained and examined for endospores. No Rifampicin resistant, gram positive, spore forming bacteria were recovered from controls; however, gram positive, spore forming bacteria resembling B. subtilis were recovered from all treated trees.

9:45 **Break**

10:00 EFFECTS OF DRAINAGE AND TILLAGE SYSTEM ON PHYSICAL PROPERTIES OF A LAKEBED SOIL (MOLLIC OCHRAQUALF) IN NORTHWESTERN OHIO.
R. Lal, T. J. Logan, D. J. Eckert, and N. R. Fausey. The Ohio State University, Department of Agronomy, 2021 Coffey Road, Columbus, OH 43210-1086.

Eight field runoff plots (each measuring 30 x 12 m) were established at Hoytville, Ohio, in 1975. The cumulative water infiltration in 2-hour was 50±1 cm and 42.5±1.5 cm for no-till and plowed plots following soybean, and 16±13 and 95±90 cm for no-till and plowed plots following corn, respectively. In no-till plots, the cumulative infiltration in 2-hour in the wheel tracks region was merely 1.9±1.7 cm with a range of 0.2 to 4.5 cm. For 0-10 cm depth in the no-till plots, soil bulk densities in the traffic and no-traffic zones were 1.52±0.04 and 1.36±0.04 Mg m^{-3}, respectively. The bulk density in the plowed layer immediately after plowing was 1.11±0.08 Mg m^{-3}. Soil bulk density of the layer immediately beneath the plowed layer was 1.45±0.08 Mg m^{-3}. Out of the total precipitation of 28.6 cm, the mean seasonal runoff and drainage flow in 1980 were 3.5 and 16.5 cm for plowed versus 6.3 and 16.8 cm for no-till plots, respectively. The sediment load in surface runoff and tile flow in 1980 were 135 and 16 kg/ha for plowed versus 15 and 7 kg/ha for no-till plots. In 1987 the soybean grain yield was not affected by tillage system, and the mean yield was 2.4 t/ha. In contrast, corn yielded slightly more grains in plowed (6.4 t/ha) than in no-till treatments (6.2 t/ha).

10:15 TREE RING CHRONOLOGIES AND FOREST DISTURBANCES: A SPATIAL AND TEMPORAL ANALYSIS. Do Soon Cho and Ralph E.J. Boerner, Deparment of Botany, The Ohio State University, Columbus, Ohio 43210.

Goll Woods is an old-growth forest remnant located in the Black Swamp Physiographic Province of NW Ohio. Its most unique feature is the presence of very large oaks (Quercus spp.) which emerge through the dense beech-maple-ash (Fagus-Acer-Fraxinus) canopy. Our studies of vegetation patterns and tree ring chronologies have suggested that these emergent oaks established following one or more large disturbances in the past. In contrast, prior studies of beech-maple forests have indicated that beech, sugar maple, and white ash establish best in small to moderate sized treefall gaps. Thus we hypothesized that the disturbance regime (frequency/size) has changed since settlement by European man. To verify this, we have analyzed the tree ring chronologies of approximately 65 trees of 8 species ranging from shade tolerant (e.g. beech) to intolerant (e.g silver maple). We report here the analysis of establishment, release, and canopy recruitment dates of these trees as a means of determining whether the spatial pattern and size of canopy disturbances has changed over time.

10:30 RELATIVE MYCORRHIZAL DEPENDENCY AND RESPONSIVENESS OF CONGENERIC, SYMPATRIC SPECIES: IMPLICATIONS FOR SECONDARY SUCCESSION.
Ralph E.J. Boerner, Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Though it is common knowledge that most plants are dependent to some degree on mycorrhizae for nutrient uptake, the degree of dependency (defined as the fertility range over which the plants require mycorrhizae) and the responsiveness (defined as the amount of growth enhancement) are known for few species. To best predict how differences in these two parameters might affect interspecific interactions during early succession, I grew congeneric, sympatric pairs with and without VAM inoculation and at high/low P. The annual Panicum (Graminae) was less dependent and responsive than was the congeneric perennial. Only inoculated perennial plants were capable, however, of controlling P pool sizes in the soil, so there may be trade-offs between the cost of mycorrhizal maintenance and the ability to control resources levels. Neither annual nor perennial Silene (Caryophyllaceae) species were dependent but the annual exhibited a negative response to inoculation at low P supply: 40% of plants died in 8 weeks. Results of similar experiments with Geranium species and effects of the fertility regime from which the seeds came on responsiveness will also be discussed.

10:45 V-A MYCORRHIZAE AND THE TRANSPORT OF AN ALLELOPATHIC COMPOUND PRODUCED BY SOLIDAGO CANADENSIS. SMITH, Marilyn. Department of Botany, Miami University, Oxford, Oh. 45056.

Common goldenrod, Solidago canadensis, produces a compound in its roots which has allelopathic effects on many plant species. This compound has been characterized as cis-dehydromatricaria ester, a 10-carbon polyacetylene. Studies were done to determine whether vesicular-arbuscular mycorrhizal infection of the roots facilitates either release of the compound into the soil by Solidago or uptake of the compound from the soil into the root tissue of the affected plants. Both field and growth chamber studies have been done, using four tall grass prairie species as "receptors" for the toxin. Extracts of root tissue and soil are being analyzed by HPLC to compare concentrations of the compound with degree of mycorrhizal infection. Replacement series results indicate a stimulatory effect of Solidago on Indian grass and Little Bluestem when in low concentrations, and stimulation of Switch grass at all concentrations. Big Bluestem showed a concurrent increase in height and decrease in shoot mass.

SECTION B. PLANT SCIENCES
Afternoon Session - Room 2090 Founders Hall
Saturday, April 30, 1988
Hugo Valdebenito, Presiding

1:30 SECTION BUSINESS MEETING

2:00 AMOS EATON (1776-1842) A PIVOTAL PERSON FOR AMERICAN BOTANY. Emanuel D. Rudolph, Department of Botany, The Ohio State University, Columbus, Ohio 43210.

Amos Eaton, trained as an attorney, took up writing and lecturing about natural history and chemistry as a career later in life. He was a popular public lecturer and in that way interested many in geology, chemistry, and botany. Eaton played a particularly important role in the development of American botany at a time when the country was becoming more interested in public education and in the study of its natural resources. He wrote the first manual of American plants for student use in 1817. He helped to set the pattern for teaching about plants using laboratory methods in a course he established at the Rensselaer School which he help ed to found in Troy, New York. Finally, he believed that women should be taught in a manner equal to men about plants and in doing so, trained teachers who educated many other women in botanical subjects.

2:15 A SEQUENTIALLY PAEDOMORPHIC LINEAGE AMONG THE ENDEMIC HAWAIIAN LOBELIOIDEAE (CAMPANULACEAE) Thomas G. Lammers, Department of Botany, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210-1293.

Heterochrony, i.e., phyletic change in the timing of development, seldom has been invoked as a major process of evolution by botanists. Paedomorphosis, the retention of juvenile traits of an ancestor by adults of a descendent as a result of heterochrony, is well documented among animals, but there are few obvious examples among plants. In this regard, the endemic Hawaiian genus Cyanea Gaudich. is of special interest, due to the production of distinct adult and juvenile stages in certain species. These juveniles are characterized by more deeply dissected leaves and an increased degree of armature, and often flower precociously. It has been observed that adults of certain species resemble juveniles of other species and it has been hypothesized that such species are paedomorphic. The Cyanea solanacea complex, a monophyletic lineage of 4 species on Molokai, Maui and Hawaii, offers an especially interesting system. Cladistic analysis suggests that this complex represents a lineage in which each species is derived via heterochrony from the juvenile stage of its ancestor. Not only do these plants represent one of the few clear examples of heterochrony in plants, but is also the only known example of a sequentially paedomorphic lineage, in which heterochronic evolution has occurred repeatedly.

2:30 SYSTEMATIC RELATIONSHIPS OF TRIBES OF COMPOSITAE BASED UPON PERICARP AND SEED ANATOMY. Arun K. Pandey and Tod F. Stuessy, Department of Botany, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210.

Recent systematic interest in the Compositae has focused on subfamilial and tribal relationships. Particularly intriguing have been the relationships revealed through cpDNA and morphologically based cladistic studies. These and other investigations have suggested the recognition of two subfamilies: Asteroideae and Lactucoideae. Some authors also recognize a third subfamily containing only the tribe Lactuceae. Recent cpDNA studies have suggested the Mutisieae as the most primitive tribe and have also suggested other relationships among tribes of the family. New data from pericarp and seed anatomy of more than 100 species of all tribes of the Compositae are contrasted to existing data for systematic insights. The presence of a hypodermal layer and the development of phytomelanin in both Eupatorieae and Heliantheae support a close relationship between these two tribes. Other close anatomical connections are seen between the Astereae and Inuleae and between the Calenduleae and Anthemideae.

2:45 A NUMERICAL TAXONOMIC STUDY OF THE BRACHYLAENA DISCOLOR- UNIFLORA SPECIES COMPLEX (COMPOSITAE) David W. Haines* and Timothy K. Lowrey**, *Dept. of Botany, The Ohio State University, Columbus, Ohio 43210. **Dept. of Botany, National University of Singapore, Lower Kent Ridge Rd., Singapore 0511.

The Brachylaena discolor-uniflora species complex (comprising B.discolor subsp. discolor; B.discolor subsp. transvaalensis; and B.uniflora) is endemic to south-eastern Africa. The currently recognised taxa of this complex are all large dioecious shrubs or trees. Previous workers analysed different sections of the complex on a regional basis but each treatment omitted a different section of the complex. The objective of this study was to use phenetic methods to analyse the morphological diversity of the complex throughout its range of distribution. A total of 150 female and 138 male specimens were collected and 48 (15 vegetative, 33 reproductive) and 50 characters (15 vegetative, 35 reproductive) were measured for each of the sexes respectively. The data were standardised and subjected to various analyses including Cluster (UPGMA, WPGMA, Complete Linkage), PCA, and Canonical Discriminant Analysis. Results for female and male data sets suggest that the complex consists of a coastal group (comprising B.discolor subsp. discolor) and an inland group (comprising B.discolor subsp. transvaalensis and B.uniflora). As morphological differences between the resulting groups were small it was considered appropriate to separate them at the subspecific level.

3:00 ISOZYME SURVEY OF COREOPSIS SECT. COREOPSIS (COMPOSITAE). Mary Beth Cosner and Daniel J. Crawford. Department of Botany, The Ohio State University, Columbus, OH 43210.

Coreopsis sect. Coreopsis consists of four annual and five perennial species. The section is found in the south eastern to south central United States, and has been studied extensively taxonomically and biosystematically. A number of questions remain regarding evolutionary relationships among the species. Enzyme electrophoresis was employed to address these problems. Taxa that have been previously examined include the perennial species, C. grandiflora and the four annual species. In all cases high identity values have been found among populations within each species. Data from morphology and cytogenetics show that the annuals consist of two progenitor-derivative species pairs: C. nuecensoides-C. nuecensis and C. basalis-C. wrightii. Isozyme data are concordant with this hypothesis. Subjects that remain to be addressed include elucidating the basal or ancestral species in the section and the origin of the annuals within the section. The levels and apportionment of genetic variation within and among populations differ for the various species. Preliminary results indicate high genetic identities among the species, and that all perennial species appear about equally divergent. The data suggest recent origin of the section.

3:15 THE JUNCUS EFFUSUS COMPLEX: THE LATEST LOOK. James C. Zech. The Ohio State University, Botany Dept., 1735 Neil Ave., Columbus, Ohio 43210-1293.

The number of taxa included within the Juncus effusus complex has been under controversy for a number of years. Hermann (1940), Gleason and Cronquist (1963), and Lakela (1965), all included two taxa, but differed as to which two taxa comprised the complex. Fernald (1950) included eight taxa and recently Hamet-Ahti (1980) conducted a revision of the complex and recognized four taxa. Nine varieties of the Juncus effusus complex were examined using scanning electron microscopy to establish micromorphological characteristics of the seeds to support a previously established or a new complex. Three herbarium specimens were sampled for each Juncus effusus variety on the basis of their identifier. All nine varieties exhibited a reticulate-scrobiculate tegumen configuration with a deep interspace. Based on seed tegumen configuration alone, a complex consisting of a single taxon would be supported. In addition, these results predict the taxonomic significance of seed tegumen configuration characters at the infraspecific level.

3:30 **Break**

3:45 THE FLORA OF CHILE PROJECT. Tod F. Stuessy and Clodomiro Marticorena, Department of Botany, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210, and Departamento de Botanica, Universidad de Concepcion, Concepcion, Chile.

The Flora of Chile project was inaugurated in September of 1987 in Concepcion, Chile. This project will be a cooperative effort among botanists in Chile with international participation from institutions in the United States (The Ohio State University and the Missouri Botanical Garden), England (University of Reading), and Germany (University of Munich), and from individuals throughout the world. The goal is to produce five volumes describing the 5,165 vascular plant species found both natively and introduced within the country. The ferns and fern allies comprise 152 species and the gymnosperms 16. Of the angiosperms, the dicots number approximately 3964 species and the monocots 1033. Some of the most speciose genera include Senecio (219 spp.), Adesmia (139), Oxalis (115), Calceolaria (86), Calandrinia (74), and Viola (71). Materials in support of the developing flora project include a published checklist, a history of botanical collecting in the country, a bibliography of works pertaining to the Chilean flora, and a

detailed plan of contents of volumes, guides for authors, formats for treatments of genera and species, abbreviations and financial requirements. Completion of the project is scheduled for the year 2000.

4:00 PHYTOGEOGRAPHY OF PEPEROMIA BERTEROANA. AN INTERESTING CASE OF TRANSOCEANIC SPECTIFIC DIFFERENTIATION. * Hugo A. Valdebenito and Tod F. Stuessy. Dept. of Botany, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210.

Peperomia berteroana Miquel (1843) and P. tristanensis Christophersen (1944) are fleshy, terrestrial herbs, with simple shoots and oblanceolate leaves distributed in verticils. The former species is present in the oceanic archipelago of Juan Fernandez, Chile (33 S,80 W) in the eastern Pacific and the latter in Tristan da Cunha, U.K. (37 S,12W) of the South Atlantic. Both species are extrely similar with only small differences in leaf vestiture, venation, and inflorescence configuration. Christophersen (1968), on the basis of evidence put forward by Skottsberg (1946) concluded that P. berteroana and P. tristanensis are conspecific. However, anatomical and flavonoid studies of both taxa suggest recognition at the subspecific level. Recent transoceanic long distance dispersal by birds and similar remnants of an ancient Nothofagus flora are discussed with reference to these distributional patterns.

4:15 SEED MORPHOLOGY AND RELATIONSHIPS OF FOUR ENDEMIC SPECIES OF PEPEROMIA (PIPERACEAE) OF THE JUAN FERNANDEZ ISLANDS, CHILE. * Hugo A. Valdebenito. Dept. of Botany, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210.

The fruit configurations of four endemic species of Peperomia in the Juan Fernandez Islands, Chile (32 S,80 W) were studied with SEM and compared with fruits of species of different subgenera of Peperomia. With the exception of P. fernandeziana which belongs clearly to subgenus Sphaerocarpidium, the placement of the other three species has been controversial. Peperomia is currently subdivided into nine subgenera, based mainly on fruit structure (Dahlsteadt, 1900). Two subgenera, Tildenia and Panicularia, have apical stigmas and erect fruit apices very similar, but not identical, to the drupes found in the taxa of the Juan Fernandez Islands. Based on peculiar SEM fruit morphology (subapical stigmas and suboblique fruit apices) and vegetative morphology (oblanceolate leaves, paniculate inflorescences, early deciduous leaves downward) treatment of these endemics as a separate subgenus Tildeniidium (as recommended by Skottsberg 1947) seems warranted.

4:30 A PHYLOGENETIC ANALYSIS OF NYSSACEAE. Jun A. Wen and Tod F. Stuessy, Department of Botany, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210.

The Nyssaceae consist of three genera with eight species: Camptotheca (1 sp.); Davidia (1 sp.); and Nyssa (6 spp.). Five of the taxa occur in Eastern Asia and three in eastern North America. Many previous studies have been done on the Nyssaceae, covering fossil history, morphology, fruit and wood anatomy, embryology, cytology, and chemistry (alkaloids fatty acids and oils). Despite the considerable available comparative data, no synthesis to reveal phylogenetic relationships has been done. The present investigation presents a cladistic study of all available information. Fossil evidence, ontogeny, and outgroup comparison all are used to infer character state polarities. The resultant cladograms indicate Davidia as the most recent close ancestor of Nyssa. Within Nyssa, N. sylvatica of North America and N. sinensis of China show a close relationship and a disjunct transcontinental distribution. At least two major evolutionary lines are seen within the genus.

SECTION C. GEOLOGY
Morning Session - Room 2156 Founders Hall
Saturday, April 30, 1988
Robert J. Malcuit, Presiding

9:00 GEOLOGIC INVESTIGATIONS FOR THE OHIO SSC PROPOSAL, Ronald G. Rea, Richard R. Pavey, E. Mac Swinford, Ohio Department of Natural Resources, Division of Geological Survey, Fountain Square, Building B, Columbus, OH 43224.

The proposed Superconducting Super Collider (SSC), if built, will be the world's largest and most powerful particle accelerator for high-energy particle-physics research. The primary feature of this scientific instrument is a 10-foot-diameter tunnel, 53 miles in circumference, which will house the electromagnetic ring of the collider. A favorable geologic setting is the highest priority for selection of the SSC site.

Exsisting geologic information for the selected Ohio site in Delaware, Marion, and Union Counties was insufficient for a detailed site proposal. However, the Division of Geological Survey's in-place mapping and drilling programs were ideally suited to produce the geologic framework required for a competent proposal.

A comprehensive series of maps, including glacial materials, bedrock topography, drift thickness, bedrock-unit subcrop, and structure on seven bedrock units, were produced. This information provided a database for the selection of the optimum Ohio SSC site.

9:15 RADON TECHNOLOGY: A SCIENTIFIC REVIEW AND HAZARD ANALYSIS IN OHIO. Darioush T. Ghahremani, Radon Survey Systems, P.O. Box 22288, Cleveland OH 44122

A variety of devices have become available in recent years for measuring radon in soil gas or indoor environment. The radon is believed to be derived from Devonian-age radioactive black shales, present in eastern Ohio. Depending on the geographic location and the type of project design, the detection technique may vary significantly. A selected number of anomalous localities discovered during past regional radon surveys in northeast Ohio were further examined for the reproducibility of different techniques and the correlation between radon gas anomalies and indoor radon concentration in nearby buildings. Results indicate that there is a good correlation between bed rock type, its fracturing, and radon migration to the surface and into the indoor environment. Radon and radon progeny values measured in the building in the vicinity of radon anomalies caused by bedrock fracturing or proximity to underlying Cleveland and Huron Members of Devonian Ohio Shale revealed values 3-8 times EPA's safe level of 4 Pci/l. (0.02WL). Additional investigation of potential radon areas in the state is needed to properly advise individuals or agencies for corrective action prior to construction and to apply effective techniques to test and remedy the infected radon areas.

9:30 MINE SUBSIDENCE IN STEUBENVILLE, OHIO. Ann G. Harris, Department of Geology, Youngstown State University, Youngstown, Ohio 44555

A unusual situation has occurred in Steubenville, Ohio where an area has been deep-mined, strip-mined and augered. Deep mining for coal, beginning in the early 1930's was the first event. It was followed by strip-mining in the middle 1950's and early 1960's. During the strip-mining operation the old workings of the commercial abandoned deep mines and smaller country banks were encountered in the highwalls of the strip mines. Therefore stripping ceased in these directions and the exposed workings were sealed off with surface mine spoil. Some augering was done into the highwalls in an attempt to recover the coal but apparently was not very successful as it was not extensive. When the stripping ended the strip mines were reclaimed according to the standards of the day.

In the early 1970's the site was platted and developed. Some blasting took place in order to install some of the utilities. By the middle 1980's subsidence began damaging several homes. Studies have shown that the mine openings in the highwall collapsed, then the highwall collapsed causing the backfill to shift, thus damaging the homes, some of them severely. Steps have been taken to stabilize these homes.

9:45 **Break**

10:00 REMOVAL OF TRACE HEAVY METALS FROM MUNICIPAL WASTEWATERS BY COAGULATION. Howard H. Lo and Stephen Hoffert, Department of Geological Sciences, and Yung-Tse Hung, Department of Civil Engineering, Cleveland State University, Cleveland, Ohio 44115.

Objectives of this investigation were to determine the effect of pH adjustment and addition of earth materials as coagulants on the removal of trace heavy metals from municipal wastewaters. Primary settled wastewaters were collected from Solon and Painesville Wastewater Treatment Plants and were spiked with high levels of heavy metals including lead, cadmium, and chromium to simulate the wastewaters of treatment plants receiving heavy metal containing industrial wastewaters. Coagulants used included zeolite, flyash, shale, limestone, and bentonite at a dosage of 2000 mg/l. Coagulation was also performed upon the sludge obtained from the wastewater at higher pH's. Results of the study indicated that by raising the pH of

wastewater by lime addition, most of the heavy metals could be precipitated out with a removal efficiency of about 100%. The resulting sludge from this process became soluble once again if the pH was lowered to below 7. By coagulating this sludge with flyash or zeolite, a relatively insoluable waste could be obtained. Limestone proved to be most effective for heavy metal removal with a maximum removal efficiency of 70%, while bentonite had nearly 50%. Coagulants seem to prove more practical when used on sludge with higher concentrations of the contaminants rather than on the wastewaters.

10:15 MOST WESTWARD HIRAM TILL DEPOSITS OF THE GRAND RIVER LOBE IN PORTAGE COUNTY, OHIO. James R. Bauder, 3095 Bernewood Drive. N.W., Canton, Ohio 44709

George White's maps (1982) of the glacial geology of northeastern Ohio indicate that the western limit of the Hiram Till associated with the Grand River Lobe was unsure in the area of central Portage County, Ohio.

Hand borings have enabled the delineation of the most western deposits of the Hiram Advance of the Grand River Lobe. These newly delineated Hiram Till deposits extend westward from the intersection of Ohio Route 44 and IR 76, through a pre-Hiram lowland, then expand laterally to the west.

There are two distinct soil series associated with the Hiram Tills in Portage County. The soils of the Mahoning-Ellsworth series are associated with the more typical glacial deposits. The soils of the Remsen-Geeburg soil series have a much higher clay content and are apparently the result of the advance of the Hiram Ice Sheet over fine-textured soil materials. The fines were incorporated into the sediment load of the glacier lobe and then later deposited as a much finer textured till.

10:30 VARIATIONS IN CARBONATE CONTENT ON THE ALLEGHENY PLATEAU IN NORTH-CENTRAL OHIO. John P. Szabo, Department of Geology, University of Akron, Akron, OH 44325

The Allegheny Escarpment had a pronounced effect on the texture and composition of tills on the Allegheny Plateau. The escarpment was a sufficiently large topographic barrier that it caused compressive flow and lowered ice velocities in the Pleistocene ice sheets. Increased entrainment of local bedrock altered the composition of tills downice from the escarpment.

Regionally, carbonate contents of tills decreased towards the glacial boundary. This decrease is not as simple as that described in exponential decay models. Where the model applies, compositional half-distances range from 5 to 20 km suggesting local subglacial dispersal and lodgement. Secondary high values occur in zones 20-30 km beyond carbonate outcrops. Regression of data using these zones and ignoring low values over the escarpment yields compositional half-distances greater than 25 km. The low values may reflect high dilution on the escarpment, or the high values may suggest that carbonate content on the plateau results from transportation of englacial debris and deposition of melt-out till. Increases in crystalline content in the coarse sand fractions may support this.

10:45 A HYPOTHESIS FOR THE DEPOSITION OF THE LOCKBOURNE SAND AND GRAVEL. Julie Weatherington-Rice, Don Clabaugh, Truman Bennett, Bennett & Williams, Inc., 2700 E. Dublin-Granville, Columbus, O. 43229

Field investigation of the Lockbourne Sand and Gravel in Franklin Co. was conducted in Fall, 1987. The Lockbourne is present in southeastern Franklin and extends into Fairfield and possibly Licking counties through the (Teays/Deep Stage Age) Newark River valley.

The Lockbourne directly overlies Minford Silt remnants, which pre-date Deep Stage. A palesol separating the Lockbourne and the Worthington Outwash indicates a hiatus between the Lockbourne and Late Wisconsinan glacial advances. Secondary cementation by iron oxide also implies Lockbourne is older than Late Wisconsinan but younger than "Illinoian" gravels in Fairfield Co. Position of Lockbourne implies deposition after Deep Stage, and before Late Wisconsinan.

Deeply weathered Black Hand and Berea sandstone remnants are present in the examined exposures, suggesting the source of the Lockbourne is from the east/northeast. Canadian researchers have determined that glacial advances into Ohio did not occur between Illinoian and Late Wisconsinan (Eyles and Westgate, 1987). An alternative hypothesis of deposition is Pre-Late Wisconsinan drainage of the "Illinoian" Taboso Lake through the Black Hand Gorge and Newark River channel into Franklin Co. and down the Scioto River.

SECTION C. GEOLOGY
Afternoon Session - Room 2156 Founders Hall
Saturday, April 30, 1988
John P. Szabo, Presiding

1:30 SECTION BUSINESS MEETING

2:00 TRENDS WITHIN TILL UNITS: A COMPARISON BETWEEN EASTERN AND WESTERN SANDUSKY COUNTY, OHIO, Michael P. Angle, Ohio Department of Natural Resources, Division of Geological Survey, Fountain Square, Building B, Columbus OH 43224.

Detailed mapping, sampling, and laboratory analyses of tills in Sandusky County, Ohio, revealed some interesting trends within specific till units. Four tills were encountered, from youngest to oldest, the clayey Hiram Till, the silty-clayey Hayesville Till, the silty-stony "upper" Millbrook Till, and the clayey "middle" Millbrook Till.

Surficial exposures of till are limited to the southeastern and western portions of the county. Thick deltaic and lacustrine sequences separate these into discrete regions. Laboratory results of the two most commonly observed tills, the Hayesville and the "upper" Millbrook, both display an increase in the amount of sand, coarse particles, carbonate content, and in relative proportions of dolomite versus calcite from east to west.

Much of this trend can be attributed to the abundant outcropping of dolomitic Silurian bedrock in western Sandusky County as opposed to the much more limited exposure of the Devonian Columbus Limestone to the east.

Observations of the "middle" Millbrook were too limited to infer any trends. The Hiram Till remained relatively uniform across the county. Reasons for the uniformity may include more limited sampling of the unit, the underlying tills serving as a buffer between the Hiram and bedrock, and the possibility of the Hiram ice sheet being watery and nonerosive.

2:15 THE UNIQUENESS OF THE DEVONIAN COLUMBUS LIMESTONE OF OHIO. Jane L. Forsyth, Geology Department, Bowling Green State University, Bowling Green, Ohio 43403.

The Columbus Limestone crops out (mostly below a cover of glacial till) in a 10-15-mile-wide band extending N-S through central Ohio. To the north, it forms an impressive cuesta extending out into Lake Erie, while to the south, the band ends in SW Pickaway County, evidence of the southward-transgressing Middle Devonian sea. The Columbus Limestone is unique in Ohio, where carbonate bedrock is extensive but mostly dolomitic, because it is so pure (containing 95% $CaCO_3$ with only tiny amounts of impurities, while other Ohio limestones (Brassfield, Dayton, Delaware) have only 60-80% $CaCO_3$ with significant percentages of silica, alumina, carbon and iron). As a result of this remarkable purity, all solution-formed caves in Ohio (Ohio and Zane Caverns) occur in this unit (Seneca Caverns and Perry's Cave are basically collapse features), as do all major areas of sinkholes (those NW of Columbus, in northern Logan County, and especially south of Castalia). It is remarkable that the Columbus Limestone cuesta north of Bellevue, far north of the glacial border, is such a strong topographic feature, with the limestone surface very shallow, sinkholes abundant (including one a mile long and 75 feet deep near Castalia that is probably the biggest sinkhole in Ohio), and water reemerging from this karstic landscape in the famous Blue Holes (there are three of them!) near Castalia.

2:30 REGIONAL JOINT PATTERN OF NORTH-CENTRAL OHIO. NICHOLSON, Howard T., Department of Geology, The College of Wooster, Wooster, OH 44691.

A systematic joint pattern study was undertaken in the western-most part of the Appalachian Plateau across the Central Lowlands and onto the Indiana-Ohio Platform. Joint orientations were taken in the Mississippian sandstones and Devonian carbonates of north-central Ohio from Wayne County westward to Hancock and Hardin counties. Joints were examined with respect to vertical extent, frequency, and relation to the orientation of the wall face. This study was initiated to determine whether jointing characteristics and relationships established by Ver Steeg (1942), Nickelsen and Hough (1967), and Isogai (1984) can be confirmed in the study area. Joint characteristics that have been studied are variance in joint orientation regionally, variance among different lithologies, and joint morphology. Relationships of joints with structural features and provinces have been analyzed and the pattern in the study area compared to patterns reported in eastern Ohio by the previously mentioned workers. Few aspects of jointing seem regionally consistent, and most characteristics are variable over the study area. Jointing

appears to be dependent on lithology and structural province. Other factors such as outcrop geometry and weathering characteristics also affect the pattern locally. Surface morphology of the joints, such as plumose markings, could not be studied extensively since the joint faces have experienced sufficient weathering to destroy these delicate features.

2:45 THE ELK CREEK BED (UPPER ORDOVICIAN, CINCINNATI GROUP) IN BUTLER AND WARREN COUNTIES, OHIO, E. Mac Swinford, Douglas L. Shrake, and Gregory A. Schumacher, Ohio Department of Natural Resources, Division of Geological Survey, Fountain Square, Building B, Columbus OH 43224.

The Elk Creek bed is a newly recognized informal unit of the Arnheim Formation of the Upper Ordovician Cincinnati Group. Recognition of this bed is an outgrowth of mapping in Butler and Warren Counties as part of a statewide geologic mapping program currently being conducted by the Ohio Department of Natural Resources, Division of Geological Survey. To date, the Elk Creek bed has been identified in Lemon, Madison, and Wayne Townships of Butler County and Franklin Township of Warren County.

The Elk Creek bed overlies the fissile-parted shale and nodular limestone of the upper portion of the Arnheim Formation and underlies the thick platy-parted shale and planar limestone of the Waynesville Formation. The Elk Creek bed varies from about 4.5 to 9.9 feet in thickness and can be separated into upper and lower portions. The lower portion consists of thin- to medium-bedded, nodular, argillaceous limestone. The upper portion consists of nodular, wavy, or planar limestone with interbedded platy- to fissile-parted shale. The upper portion is capped by a distinct medium-bedded, planar, coarse-grained limestone layer. The Elk Creek bed is interpreted to have been deposited in a shallow marine environment that may have undergone episodes of slow sedimentation, subaerial exposure, or erosion.

3:00 **Break**

3:15 GEOLOGY OF AUQAKUH VALLIS, MARS. Philip J. Winchell, Wittenberg University, Springfield, Ohio 45501

This study was performed under the auspices of Kenneth L. Tanaka and David J. Mackinnon of the U.S.Geological Survey, Flagstaff, AZ. Auqakuh Vallis, located at long. 300° and lat. 30° N. and being some 400 km in length, is a major channel feature on the Martian surface. Mariner 9 and Viking satellite images have led workers in the field to classify Auqakuh Vallis as a fretted type channel, i.e., one possessing steep sidewalls and wide, smooth floors. However, our photoclinometric cross-sectional profiles show that the channel's sidewall slopes are relatively shallow, seldom exceeding 13°. Geologic mapping of the channel area has revealed the presence of at least five distinct bedding units, most likely impact breccias and lavaflows, as well as meanderlike scars, cutoffs and a hanging valley. Planimetrically, the channel resembles a branching stream network, but with only the trunk sections present and no lower order tributaries visible. Although the geological processes of channel formation are speculative at best, it appears very likely that Auqakuh Vallis was formed by the actions of liquid water. Downcutting of the channel is thought to have occurred very slowly by a process of headward erosion by ground-water sapping, alternating with periglacial downslop movement processes that resulted in shallow sidewalls. These processes occurred approximately 3.5 b.y.b.p., when the Martian climate was much warmer than at present.

3:30 COMPUTER SIMULATION OF INTACT GRAVITATIONAL CAPTURE OF A LUNAR-LIKE BODY BY EARTH. Robert J. Malcuit, David M. Mehringer, and Ronald R. Winters, Denison University, Granville, Ohio 43023

A computer code has been developed to simulate capture of a lunar-like body from a heliocentric orbit into a geocentric orbit by way of a combination of three-body gravitational interactions (Sun, Earth, and lunar-like body) and radial tidal energy dissipation within the Earth and lunar-like body. Input parameters for the calculation are: (1) masses of Sun, Earth, and lunar-like body, (2) deformation constants (displacement Love numbers) for Earth and lunar-like body, (3) planetary Q factors for Earth and lunar-like body (Q=reciprocal of the fraction of stored energy that is dissipated within a deformable body per encounter cycle), and (4) the distance of closest approach for the initial close encounter of the encounter scenario. For each of these orbital simulations we start with an initial, energy dissipating, close encounter. Then we calculate the orbital evolution sequence for successful capture cases for a maximum of 20 orbits. In subsequent runs we change only one variable until capture does not occur. The alternatives to stable gravitational capture are: (1) escape into heliocentric orbit and (2) collision with Earth. By these numerical simulations we are able to demonstrate that intact "whole-body" gravitational capture is possible under geologically realistic conditions that could have prevailed in the early history of the Solar System.

SECTION D. MEDICAL SCIENCES
First Morning Session - Room 2174 Founders Hall
Saturday, April 30, 1988
Kathleen Schroeder, Presiding

9:00 PATIENTS' PERCEPTIONS OF THERAPISTS AND THEMSELVES. FITZGERALD, R. V., FRANCO, Kathleen, and CARROLL, Brendan, Dept. of Psychiatry, C.S. 10008, Toledo, OH 43699 (MCO)

The research project reported in this article is neither a "satisfaction" nor an "outcome" study. However, it is intimately connected with both. It may be unique in that the subjects are adults from multiple private settings who terminated their psychotherapeutic treatments from six to eighteen months previously. And it probes twenty dimensions of patients' perceptions of their therapists and themselves during or as a result of therapy.

Because clients/patients who returned questionnaires viewed their therapies very postively, these results are comparable to previously reported "satisfaction" findings. We also found what others had reported about the significant correlation between length of treatment and response rate. A noteworthy finding not reported in the literature we reviewed was the significant correlation between certain perceptions of themselves resulting from therapy and therapists' global ratings of improvement.

The findings reported here demonstrate the critical importance to psychotherapy, and by extension to all mental health treatment, of the "good" *therapist-patient relationship*. These findings also raise a challenging question for future research: "Which specific therapist attributes and behaviors are most compelling in assuring positive patient reactions, including treatment effectiveness?" The answer could enhance our patients' regard for psychiatry profoundly.

9:15 EATING DISORDERS AMONG MEDICAL AND NURSING STUDENTS. TAMBURRINO, Marijo B., FRANCO, Kathleen N., CARROLL, Brendan T., SAJATOVIC, Martha, FLOYD, Cindy. MCO Dept. of Psychiatry, C.S.#10008, Toledo, OH 43699.

Medical students (201) and nursing students (161) from a midwestern university completed a demographic survey and the Eating Attitudes Test (EAT-26). Of the 118 male medical students, 1.7% (N=2) scored in the abnormal range on the EAT, and 2.4% (N=3) reported having an eating disorder. 10% (N=1) of the ten male nurses scored high on the EAT and also reported having bulimia. 18.0% (N=15) of the 83 female medical students and 18.2% (N=26) of the 151 female nursing students scored above normal on the EAT. On self-assessment, 7.2% (N=6) of the women medical students were anorexic and 4.8% (N=4) bulimic, compared to the female nurses' reports of 0.6% (N=1) anorexia and the 9.2% (N=14) bulimia.

The authors hypothesize that the obsessive-compulsive traits that help students get selected into medical school may also make them more vulnerable to developing anorexia nervosa. Personality traits such as passivity and low self esteem found in many female nurses relate more closely to the characteristics of bulimics and may predispose them to bulimia. A significant number of women who cited their weight problems as beginning during preadolescence (10-13 years) scored highest on the EAT. These findings suggest that cultural and educative efforts to accept one's body must begin at a very early age.

9:30 CONFOUNDING VARIABLES AND INTENTIONALITY IN LONGITUDINAL SMOKELESS TOBACCO SCREENING AND INTERVENTION STUDIES. KL Schroeder, AGC Milo*, ED Glover, MS Chen. Ohio State University, College of Dentistry, Columbus, Ohio 43210.

We surveyed 115 male, college ST users 18-35, currently involved in a screening/intervention program, for behavioral patterns of ST use, cigarette smoking, past experimentation with drugs/alcohol, and gratification from usage(stress reduction and socialability). We also address personal responsibility by inquiring will the subject continue or quit using ST due to a warning placed on the package. The test, re-test reliability of this survey was r=.79-1.0. It was found that 85% used ST only, 15% used both ST and cigarettes, 71% used hard liquor, 46% marijuana, 13% other drugs. 84% used ST for stress reduction. Of their closest friends 60% used tobacco, 70% using ST, 57% family members

using tobacco, 46% ST, 48% of users participated in baseball, 45% basketball, 33% football. Considering intentionality, only 7% of the ST users intended to quit in 1yr,16% in 5yrs, of those who smoked 47% intended to quit in 1yr, 53% in 5yrs. 19% will quit due to the warning label. Only 9% of the ST users were told of a white patch or irritation due to dipping/chewing by their dentist. Results indicate that labels may not be effective enough, and programs for ST reduction would most effectively be geared at reducing stress, involving family members and friends, as well as greater involvement of the dentist in health awareness of oral lesions and other health problems.

9:45 EVALUATION OF SURFACE VACUOLIZATION AND KERATINIZATION IN INDUCED EPITHELIAL HYPERPLASIA. KL Schroeder, DA Mendel*, KA Szczepanek. The Ohio State University, College of Dentistry, Columbus, Ohio 43210.

Surface vacuolization, extent of keratinization and other variables which may be an indication of alkalinity, or have direct implications to permeability and carcinogenic potential of smokeless tobacco lesions, 47 tissue samples from male ST users, previously characterized by routine histopathologic analysis(Schroeder, et al, 1987), were studied more specifically for extent of vacuolization and keratinization relative to usage(light, moderate, heavy), severity of the lesions(Degree 1,2,3) and length of ST exposure. Samples were stained for keratins by the Ayoub-Sklar method and immunoperoxidase techniques(Dako K528) for broad spectrum cytokeratins. Presence and depth of surface vacuolization was recorded (20X). 17 subjects demonstrated surface vacuolization ranging from .33-1.61um. Depth of vacuolization had positive correlations with usage(r=.61) and lesion severity (r=.64). Keratinization appeared strongest in degree 3 lesions. No association appeared with overall length of ST exposure, keratinization and vacuolization. Broad spectrum cytokeratin screening exhibited a graded sensitivity to degree of lesion and ST usage. Vacuolization, possibly a response to permeability changes, appears directly related to repetitive ST exposure.

10:00 "MAMMOGRAPHIC BREAST LESIONS" Greg Vest, M.D. and Stephen Buday, M.D., 793 West State Street, Columbus, Ohio 43222.

During a 28-month period, from March, 1985 to August, 1987, 236 needle-directed breast biopsies were performed on 232 female patients, from ages 26 to 76 years. Mammographic studies were done in view of breast symptoms, family history of risk factors for the development of breast cancer, the recommendations of the American Cancer Society, and prior treatment of one breast for cancer. Invasive cancer was found in 12.5% of biopsies, and benign lesions in 87.5 percent. Microcalcifications were found in 23.5 percent of the malignant lesions, and in 37 percent of the benign lesions.
Needle-directed biopsies of radiographic lesions are accurate and easily performed. Microcalcifications, however, are not necessarily a reliable indication of malignancy.

10:15 PREVALENCE OF ORAL HERPES SIMPLEX AMONG OBSTETRIC/NURSERY NURSING PERSONNEL. Vigdorth, E., and Shank, M., R.N., M.S.N. University Hospital, University of Cincinnati Medical Center, 234 Goodman Street, Cincinnati, Ohio 45267-0788

In some hospitals, Infection Control policy prohibits direct patient contact by obstetric and nursery personnel when they have active oral herpes simplex, although the cost of such a policy is unknown. A survey of obstetrical and nursery nursing employees in a 600 bed hospital was undertaken. In a self-administered questionnaire returned by 98 (70%) of 141 full time nurses, 41 (42%) reported ever experiencing a cold sore or fever blister. Sixty-nine percent reported ever experiencing a prodrome prior to the outbreak. Most frequent warning symptoms were tingling (63%), itching (56%), pain (22%), or burning sensation (22%). Events suspected of triggering an outbreak were emotional stress (66%), fever (29%), sunlight (27%), and hormonal changes (17%). Twenty-five nurses reported experiencing a total of 57 outbreaks within the previous 12 months. Only 12 of these reported to Personnel Health and a total of 70 workdays were lost (61 sick, 8 reassignment, 1 vacation). Nurses in the well baby/mother units lost 3 times as many workdays (56) versus 14 in the nursery/obstetric intensive care units. At an estimated cost of $15/hr, $8,400 in compensation costs were incurred, and if the policy had been strictly enforced, the cost would have approached $20,000.

10:30 BARRIER PROTECTION AND HEALTH STATUS OF DENTISTS RELATED TO AGE. S.Rosen, L.Mlakar, J.Crawford and M.Shaeffer. Ohio State Univ., Univ. of No.Carolina, Chapel Hill and Univ. of S.Calif. Ohio State Univ., 305 W.12th Ave., Columbus, OH 43210

With current emphasis on infection control, behavioral patterns of dentists may vary based on their age. The objective of this study was to compare the use of barriers and health status of dentists in relation to their years of practice. During 1985, a survey of dental offices was conducted in Ohio, No.Carolina, and California on asepsis procedures and health status of dental personnel. This report will limit the findings to dentists before 10, after 10 and after 20 years following graduation from dental school. Responses were obtained from 440 dentists. Barrier protection data include the use of gloves, masks, and glasses. Health status includes a variety of symptoms and diseases. Data were analyzed statistically using the chi-square test. Significant findings show that 32% of the oldest group of dentists claimed they never use gloves, whereas 10% of the youngest dentists made the same statement. Safety or regular glasses were never worn by 13% of the youngest or middle age dentists whereas only 4% of the oldest dentists made this statement. Eye injury but not eye infection was significantly greater in the youngest dentists than in middle age or the oldest dentists. The youngest and middle age dentists had more colds, but did not miss more days of work.

SECTION D. MEDICAL SCIENCES
Second Morning Session - Room 2180 Founders Hall
Saturday, April 30, 1988
C.J. Neal, Presiding

9:00 PHOTOSENSITIZERS FOR TUMOR THERAPY: PURPURIN DERIVATIVES. C. A. Foss, Y. Kim, S. H. Selman, A. R. Morgan and M. Kreimer-Birnbaum. St. Vincent Medical Center, Toledo, OH 43608; Medical College of Ohio, Toledo, OH 43699; University of Toledo, Toledo, OH 43606.

Photodynamic therapy of tumors is an evolving modality of cancer treatment. It depends upon the retention of systemically administered photosensitizers by the tumors. Tissue destruction occurs after the photosensitizers are activated by light. Purpurins are one such group of new photosensitizers. They are synthesized in good yield and absorb light in the red region of the visible spectrum (above 650 nm), a region with good tissue penetration properties.

An HPLC method was designed to study purpurins derived either from octaethylporphyrin (NT series) or from etioporphyrin (ET series). HPLC was performed on Partisil 5 C8 Reverse Phase columns and run with a binary solvent system consisting of methanol, water and tetrahydrofuran. Excellent separation of various purpurins was obtained. The purpurin designated NT2, when left standing in solution at room temperature, showed various decomposition products that are being identified with known markers. These observations on drug behavior in solution are important for the design of stable drug delivery systems for future clinical applications. [Supported in part by grants from NIH, CA-43006 and the F. M. Douglass Foundation.]

9:15 ALCAP DRUG DELIVERY SYSTEM : DELIVERY OF PROTEINS. Rose Mary Barbaro, Hamed Benghuzzi and Praphulla K. Bajpai. Biology Department, University Of Dayton, Ohio 45469

Aluminum-calcium-phosphorous oxides (ALCAP) ceramics are nontoxic, biocompatible, and biodegradable. The purpose of this investigation was to study the delivery profiles of pepsin, B-lactoglobulin, chymotrypsinogen, bovine serum albumin, gamma globulin, and hemoglobin proteins by ALCAP ceramic capsules in a closed static system consisting of phosphate buffered saline (pH 7.4). ALCAP capsules were fabricated by calcining mixtures of aluminum, calcium, and phosphorous oxide powders and sintering the compressed cylinders of desired size particles. Protein released from each capsule was determined colorimetrically. The results of this investigation suggest that: (1) the molecular weight and isoelectric pH of the protein play an important role in the release of proteins from the ceramic capsules. (2) components of ALCAP

capsules probably interact with the acidic and basic amino acids of the protein molecules. (3) impregnation of ALCAP capsules decreases the rate of release of proteins from the ceramic reservoir.

9:30 ALCAP DRUG DELIVERY SYSTEM : DELIVERY OF STEROIDS. Steve Beck, Hamed Benghuzzi and Praphulla K. Bajpai. Biology Department, University Of Dayton, Ohio 45469.

Aluminum-calcium-phosphorous oxides (ALCAP) ceramics are nontoxic, biocompatible, and biodegradable. In vitro delivery of testosterone, dihydrotestosterone, danazol, estradiol, progesterone, and androstanedione, were accomplished by means of ALCAP ceramics and ALCAP ceramics impregnated with polylactic acid (PLA). The delivery rates of the steroids were determined spectrophotometrically. The data obtained suggest that: (1) polymer impregnated ALCAP ceramic capsules are capable of delivering steroids in an individual or combination form. (2) impregnation of ALCAP ceramic capsules decreases the rate of release of steroids from the ceramic reservoir. (3) molecular structures and weights of the steroids influence their rate of release from ALCAP capsules.

9:45 DEVELOPMENT OF A NEW TECHNIQUE USING NORMOTHERMIC KREBS-HENSELLEIT AUTOPERFUSION FOR RAT HEART-LUNG TRANSPLANT. R. Marmaduke, F. Sadri, and D. Ely. Biology Dept, Univ of Akron, Akron, OH 44325

We have developed an anterograde autoperfusion technique which has achieved ex vivo preservation of rat heart-lung blocs (HLB) for more than three hours with normothermic Krebs-Henseleit (K-H) solution. Animals were anesthetized (Brevital, 75mg/kg), trachea cannulated, and access to HLB was via a midline sternotomy. Hemorrhage was minimized by use of the cautery. The thymus was removed and the precaval, postcaval and azygous veins, and the ascending aorta were isolated and dissected. Catheterization of the right precaval was followed by injection of .1 ml heparin (5000 units/ml) in 1 ml chilled K-H solution. Excision of the HLB followed division of azygous and caval veins. Ischemia was limited by immersion of the HLB in chilled K-H solution and swift mounting and cannulation of the aorta to begin perfusion (2 min.). A 95% O_2/5% CO_2 gas mixture was bubbled (1L/min.) in a reservoir containing 1.5L of K-H. Perfusate was heated to 37°C by a waterbath heat exchanger. Preload pressure ranged between 4-8 mmHg. Afterload pressure was varied from 60-100 mmHg and a one-way check valve at the end of the aortic hydrostatic line was used. Preload flow was controlled at 5, 10 & 15 ml/min. using a Nurpo Valve. Lungs were ventilated at depth 2.5 ml and rate of 60/min. Apical left ventricular and pulmonary samples were examined for mitochondrial integrity and catecholamine content measured to determine the extent of damage to both pulmonary and heart tissue.

10:00 ALTERATION IN CARDIOVASCULAR HEMODYNAMICS FROM SMOKELESS TOBACCO USE IN YOUNG ADULT MALES. KL Schroeder*, CJ Neal Jr., MS Chen. The Ohio State University, College of Dentistry, Columbus, Ohio 43210

We surveyed 50 college male ST users(18-35) for behavioral patterns of ST use. Additionally, a subset of 25 ST users compared to 25 non-tobacco using controls, were monitored for acute responses to tobacco use or non-use, through blood pressure, heart rate, mean arterial pressure, and blood sampling for nicotine/cotinine changes and Diagnostic Multichem analysis. Survey results revealed only about 30% of the subjects felt ST could increase blood pressure, while over 90% felt cigarettes could lead to cardiovascular problems. 65% felt ST was a safe alternative to cigarettes. Yet from an acute response, after 15 minutes of use of their regular brand of ST, significant mean increases(p=.05) occurred with ST users in diastolic blood pressure of 11 mmHg, mean arterial pressure increased 9mmHg, and heart rate increased 14 beats/minute. Nicotine levels increased between 2-60ng/ml and cotinine between 11-340 ng/ml. Furthermore, 40% of the ST users exhibited significantly(p=.05) elevated triglycerides(>190mg/dl), mean-276mg/dl; as well as elevated blood iron levels(>180ug/dl)mean =232ug/dl. These results have implications for cardiovascular compromization with ST. Also, noted elevation in blood iron may be a result of hemolysis of RBC's or inherent high iron content in ST, or both, which could have implications for hemochromatosis.

10:15 EFFECTS OF SMOKELESS TOBACCO ON PERIPHERAL CARDIOVASCULAR FLOW IN YOUNG MALE ADULTS. CJ Neal Jr.*, KL Schroeder, CJ Wenrick. The Ohio State University, College of Dentistry, Columbus, Ohio 43210.

There is general agreement that smoking induces digital vasoconstriction and can impair wound healing. Therefore, in a similar manner, the nicotine topically absorbed from smokeless tobacco(ST) could also contribute to peripheral cardiovascular alterations, and is in need of study. We surveyed 50 young adult male ST users(age 18-35) for usage patterns and behavioral profile. Ten subjects participating in examination for peripheral vascular changes were analyzed for blood nicotine/cotinine levels for verification of use. A TSI Laserflo Blood Perfusion Monitor was used with a standard probe affixed to the right forearm skin of ST subjects in a sitting, resting state. Peripheral cardiovascular changes were measured in the abstained state, and 15 minutes after ST use. The mean changes in relative skin blood flow (SBF), skin blood volume(SBV), and skin blood velocity (SBVel) were transformed into % change from baseline values for the 15 minute time period: $\%\Delta SBF_i = (\bar{x} SBF_i - \bar{x}SBF_b)/\bar{x}SBF_b$ where i=the measurement after 15 minutes, and b=baseline. A significant decrease occurred in relative mean SBF(55%) and relative mean SBV (39%). No significant change was noted in relative mean SBVel. These results have implications to longitudinal cardiovascular function and may have relavance to impaired neuromuscular reactivity noted in ST users.

SECTION D. MEDICAL SCIENCES
Afternoon Session - Room 2174 Founders Hall
Saturday, April 30, 1988
Sam Rosen, Presiding

1:30 SECTION BUSINESS MEETING

2:00 THE ENZYMATIC BASIS FOR SULFATION OF PHYSIOLOGIC CORTISOL LEVELS IN FEMALE RAT LIVER. Kathy Gaydos, Eric Olson & Sanford S. Singer, Chemistry Department, U. of Dayton, Dayton, OH 45469.

Pharmacologic levels of glucocorticoid(GC), typified by cortisol(HC), are sulfated in vivo and in-vitro in female rat liver via cytoplasmic sulfotransferases I, II, and III(STI, STII, & STIII). In-vivo GC sulfation also occurs in rat liver at physiologic levels as low as 100 pM. Because STI, STII, & STIII have HC K_ms near 10 µM, we tested cytosol to determine the basis of the HC sulfation. We found cytosol to contain enzyme activity that catalyzed cortisol sulfation at 8.00-2,000 pM and gave the product seen with pharmacologic HC levels. We did not observe a lower K_m for HC. However, we found a 3.46±1.6 µM K_m for 3'-phosphoadenosine-5' -phosphosulfate(PAPS), the coenzyme, in addition to the higher K_m we reported earlier. Cytosol fractionation on DEAE-Sephadex showed that STI, STII & STIII catalyzed sulfation of physiologic HC levels in vitro. Further purification of STIII (the GC-preferring sulfotransferase) was carried out on 3',5'-ADP agarose.The K_ms for PAPS, the pH optimum for physiologic HC sulfation and the substrate preference between 450 pM HC and 450 pM gonadal hormones were ascertained with purified STIII.

2:15 LEAD POISONING THERAPY WITH 2,3 DIMERCAPTOPROPANE-1-SULFONATE (DMPS). Younghee Kim[1,2], Michael R. Lust[1], and Martha Kreimer-Birnbaum[1] [1] St. Vincent Medical Center, Toledo, OH 43608, and [2]Bowling Green State University, Bowling Green, OH 43403.

Excessive body burden with lead is still a significant health problem. Chelating agents are available for treatment of lead poisoning, but improved drugs are needed, especially ones that may be given orally. One such drug is DMPS. The drug was tested in 6 rats (Pb group) that had received lead as lead acetate (200 µg/ml) in the drinking water for 35 days, and in 6 control rats (Controls). Lead was discontinued, 6 days later a first DMPS treatment (50 µmol/kg b.w./day) was given i.p. for five consecutive days. Two further treatments of DMPS were given at 9 and 16 day intervals. The first two courses brought down the blood lead (BPb) from 53 ± 16 (m ± SD) to 36 ± 5 and 22 ± 5 µg/dl, respectively. Thirty days after the last treatment BPb was unchanged. Red cell δ-aminolevulinic acid dehydratase (ALA-D) activity was inhibited in the Pb group vs Controls:

227 ± 48 vs 358 ± 37 nmoles of porphobilinogen/ml rbc/hr. The Pb group showed an increase in ALA-D activity after the second DMPS treatment and remained essentially at the same level thereafter. Total erythrocyte porphyrins gradually declined after the three DMPS treatments. No obvious side effects were observed in either group. These studies suggest that repeated, low doses of DMPS may be an effective therapy for lead poisoning. [Supported in part by a grant from the F. M. Douglass Foundation.]

2:30 TIMECOURSE OF ADRENAL STEROID RESPONSE TO ETHER STRESS OR CRF INJECTION OF YOUNG CHEMICALLY HYPOTHYROID RATS. Lee A. Meserve and Laura M. Juarez, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403-0212.

Many studies have shown chemically-induced hypothyroidism delays development of hypothalamus-pituitary-adrenal (HPA) axis. The present study was done to determine circulating corticosterone levels at times after ether stress or pituitary stimulation in young hypothyroid rats. Hypothyroidism was induced by feeding thiouracil (0.25%) in maternal diet from day 1 of pregnancy. At 15 days of age euthyroid and hypothyroid pups were exposed to ether fumes for 1 min, or were injected with corticotropin-releasing factor (CRF, 10 ng/g) or with injection vehicle. Animals were decapitated before, or 15, 30 or 45 min after stimulation, and circulating thyroxine (T_4) and corticosterone levels were determined by RIA. Thiouracil lowered T_4 levels to 20% of normal and depressed HPA axis response to ether stress. Corticosterone levels after CRF injection were slightly, but not significantly, subnormal in hypothyroid rats. However, hypothyroid young distinguished between vehicle and CRF injections better at 15 and 30 min than did euthyroid controls. Since response to all stimuli had not peaked by 45 min after administration, corticosterone levels should be measured at later time points. (Supported by a grant from the Faculty Research Committee, BGSU).

2:45 IMPROVED SHORT AND LONG TERM (24 HR) MITOCHONDRIAL AND FUNCTIONAL HEART PRESERVATION WITH A CALCIUM ANTAGONIST. Dan Ely, Karen Zeller, Fereydoon Sadri, and Don Ott. Univ. of Akron, Akron, OH 43225.

In vitro organ preservation has been hampered by ultrastructural damage leading to functional impairment upon reperfusion. Hearts of male Wistar-Kyoto rats were isolated (Langendorff) and perfused with Krebs-Henselleit (K-H) solution at 37°C. After stabilization, hearts were perfused (80 mmHg) with calcium free K-H at 37°C for 15 min., then reperfused with K-H for 15 min. (control group). Left ventricular pressures were recorded at balloon volumes .05-.30 ml. In another group the procedure was repeated using Verapamil (V) added to the reperfusion solution. In order to assess the benefit of V in long term preservation, another group of rat hearts were perfused at 10 mmHg and 5°C with hormone enchanced cardioplegia for 24 hours. The hearts were then warmed (37°C) and perfused with K-H + V at 80 mmHg and pressures were recorded and apical LV biopsies were obtained for norepinephrine (NE) analysis and electron microscopy. The optimal V dosage of three tested (0.13, 0.25, 0.50 mg/L) in maintaining systolic pressure after 24 hours (76%) was 0.13 mg/L, whereas without V the systolic pressure was only 55% of normal after 24 hours. Myocardial NE was correlated to functional recovery ($r=.70$ $p<.01$). V added to the reperfusate both in short term, and to cardioplegia in the long term, maintained mitochondrial integrity and increased functional recovery as compared to controls without V.

3:00 INFLUENCE OF MATERNAL DIETARY PCB ON THYROID STATUS AND ADRENAL RESPONSE IN THE FIFTEEN DAY-OLD RAT. Betty A. Murray and Lee A. Meserve, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403-0212.

Polychlorinated biphenyls (PCBs) are used widely in industry. Uses include dielectric fluids, plasticizers, and solvents. Through spills and dumping, PCBs are relatively widespread environmental pollutants which alter thyroid function in adult animals. Furthermore, PCBs cross the placenta to the fetus and are transferred to pups via mother's milk. The present study used 15 day-old Sprague Dawley rats to test effects of maternal dietary PCBs on thyroid hormones and adrenal hormone response to stimulation. Pregnant test dams were fed diet containing 250 ppm of PCB from day one of pregnancy to termination of the experiment. Each litter of 8 pups was sacrificed on day fifteen; 2 pups were controls, 2 ether stressed, 2 injected with ACTH and 2 injected with CRF. PCB did not affect the number of live pups born, but profoundly effected weight gain with 15 day-old test pups weighing 33% less than controls. Thyroxine was depressed level in circulation in the test animals. However, PCB exerted a minimal influence on the biologically active thyroid hormone, triiodothyronine (T_3). Enlarged livers of the test animals suggested enhanced function, perhaps including increased conversion of T_4 to T_3. Pituitary-adrenal function appeared to be subnormal as well. (Supported by a Research Challenge Grant, OBOR/BGSU).

3:15 SEIZURE BEHAVIOR AND LEVELS OF GABA IN THE SUBSTANTIA NIGRA OF RATS ADMINISTERED KAINIC ACID PERIPHERALLY. Lillian M. Shaffer and Lee A. Meserve, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403-0212.

Gamma-amniobutyric acid (GABA) is an inhibitory neurotransmitter implicated in the control of induced seizures. The substantia nigra, a discrete area of the midbrain, has been shown to be the site of GABA influence in seizure mediation. The present study determined behavioral progression and levels of GABA in the substantia nigra after peripheral injection of the neuroexcitant kainic acid (KA). Adult Sprague-Dawley rats were injected intraperitoneally with either 12.5 mg/kg KA or physiological saline. Reactions to the convulsant occurred in the order, immobility, wet-dog shakes, mastication, forelimb clonus, and rearing and falling, with recovery occurring within 4 hrs of injection. Protein and GABA levels of substantia nigra were measured at 2, 16, 24 or 48 hrs postinjection. KA did not modify protein but elevated GABA except at 16 hrs. This is in conflict with investigators using GABA synthetic enzyme activity as an estimate of its content. The discrepancy may result from product inhibition of enzyme activity by elevated GABA levels as seen here. It would be of interest to study the effect of high GABA concentrations on activity of its biosynthetic enzyme. (Supported by a grant from Sigma Xi and by the Graduate College, BGSU.)

3:30 IMMUNOHISTOCHEMICAL ANALYSIS OF CYTOKERATIN CHANGES IN TOBACCO TREATED RAT ORAL EPITHELIUM GB Iaderosa*, KL Schroeder. The Ohio State University, College of Dentistry, Columbus, Ohio 43210.

The purpose of this study was to examine snuff induced lesions in a rat model to determine any correlation between changes in epithelium and specific patterns of keratin intermediate filaments of a precancerous lesions as compared to normal tissue. 42 Sprague-Dawley rats were matched for age, weight, and divided into 2 groups:Group A=(nic. conc. 5.6mg/gm) applied directly to the lip pouch, 2 doses/day;Group B=orabase/pumice mix in a similar regimen, for examination at days 1,7,14,35,90,180 and 360. Samples of labial mucosa of the treated area were prepared for immunoperoxidase staining(DAKO PAP Kit K528),H&E,PAS,and Ayoub Shklar stain. Both non-specific keratin wide spectrum staining and a monoclonal antibody specific for cytokeratins(predominantly of M.W.51kD to53kD), were employed. A consistent progression of epithelial hyperkeratosis, hyperplasia, acanthosis was demonstrated from day 1-360. This same progression was noted concerning the increased concentration of cytokeratins found at the stratum basale. Specific staining for cytokeratins(M.W.51kD to 53kD)exhibited dispersed increased concentrations throughout the epithelium when comparing controls to treated tissue at 360 days. Thus a graded sensitivity in response to repetitive exposure to snuff was found with the immunoperoxidase staining compared to non-specific keratin staining.

3:45 The Phenomenon of Graft Acceptance/Rejection in Inbred Strains of Mice By Ronald Smeltz-Wright State Univ. 340 Hamilton Hall Dayton, Ohio 45435

Graft acceptance was observed by making skin grafts with CBA and A strain mice. It was discovered that grafts made between mice of the same strain were accepted, while those made with mice of opposite strain were rejected. It was learned that the H_2 orMajor Histocompatability Complex was responsible for the rejection process due to the difference in genetic makeup of the two strains. A procedure introduced during the experiment was the spleen cell suspension method. By injecting spleen cells into a mouse of opposite strain, antibody production was thus stimulated. When the mouse received a skin graft from the mouse that the spleen cells came from, there was a more rapid rejection of the graft because there were antibodies from the primary response. This second challenge of antibody response due to the graft is known as secondary

response, since there had been a previous exposure to the antigen. As a proof of the pre-existing antibodies, a blood sample of the mouse was spun down in a microcentrifuge and the serum portion was assayed with sheep red blood cells.

4:00 IN VITRO EFFECT OF SMOKELESS TOBACCO ON GROWTH OF ORAL BACTERIA. CJ Kesler*, S Rosen, KL Schroeder. The Ohio State University, College of Dentistry, Columbus, Ohio 43210.

The objective of this study was to determine if ST extracts would enhance the growth of potential periodontal pathogens. Bacteria selected for this study were species of: Actinomyces, Lactobacillus, Fusobacterium, Veillonella, Bacteroides, and a strain of Streptococcus mutans. Extracts of 2 brans of ST(Copenhagen[Cop] and Red Man[RM]) were made by infusion in water overnight in the cold. Extracts were half serially diluted in tubes of Brain Heart Infusion to a dilution of 1-32. Each tube, including a non-ST control, was inoculated with 0.1ml of a 24hr culture of the test microorganism. The tubes were incubated at 37°C for 48hrs anaerobically. Growth was observed in each tube by eye and scored from 0-10 based on the "button" on the bottom of the tube. Based on a control and dilutions of 1-2 and 1-32 respectively, the results were: Lactobacillus(Cop)1,4,1:(RM) 1,4,1; Fusobacteria(Cop) 0,7,3,;(RM) 0,7,2; Actinomyces(Cop) 4,9,3;(RM) 5,10,4; Veillonella(Cop) 5,9,4;(RM) 6,10,4; S. mutans(Cop) 5,10,6; Bacteroides(Cop) 0,8,0; (RM) 0,0,0. A possible explanation for the increased growth with higher concentrations of ST extrsct is that ST contains one or more substances that encourages growth.

4:15 VARIATION IN MUCOID CAPSULE PRODUCTION BY PSEUDOMONAS AERUGINOSA. Andrea L. Bayer and Martha M. Kory, Department of Biology University of Akron, Akron, OH 44325.

Cystic Fibrosis (CF) is a common genetic disease often fatal due to chronic pulmonary infection with Pseudomonas aeruginosa. In CF patients, a non-mucoid form always precedes the mucoid form. Four strains of P. aeruginosa were isolated from CF patients' sputa. Colonial morphology, negative staining with India ink, adherence to glass, precipitation of extracellular products via organic solvents, and hydrophobicity measurements with p-xylene indicated the presence of mucoid capsule in each strain. These strains also demonstrated little motility and proteolytic enzyme activity. P. aeruginosa isolated from non-CF patients, however, were found to have many non-mucoid characteristics when tested with the same assays. A "converting factor" was isolated from CF sputum by ultracentrifugation. These "converting factors" were incubated with non-mucoid P. aeruginosa and the assays repeated. There was an increase in mucoid capsule production in at least one assay by each strain. These results show that a "converting factor" in CF sputa can enhance mucoid capsule production in P. aeruginosa and that this factor may play a role in production of mucoid P. aeruginosa in CF patients.

SECTION D. MEDICAL SCIENCES
Poster Session - Adena Gym
Saturday, April 30, 1988

Board A @ 10:00 a.m. RESORBABILITY OF TRICALCIUM PHOSPHATE COMPOSITES UPON THE ADDITION OF AMINO ACIDS. J. Lonz, L. Morris, and P.K. Bajpai, Department of Biology, University of Dayton, Dayton, OH 45469.

Tricalcium phosphate (TCP) has been studied extensively as a bone substitute. Collagen, a major component of the bone, is composed of amino acids including proline, hydroxyproline, and hydroxylysine. TCP alone dissolves very quickly in solution and is unable to withstand pressure. Addition of amino acids such as proline, cysteine, and lysine strengthen TCP. This study was conducted to observe the dissolution profile of TCP-amino acid composites and the effect amino acids have on the release of components. Dissolution studies were conducted with composites of TCP with each of the above three amino acids in Tris-HCl buffer (pH 7.3) at 37 C. The composites contained a total of 250 mg of TCP and amino acids in a ratio of 2:1. Tris-HCl buffer was analyzed at day 7 and 14 for calcium, inorganic phosphate, and amino acid. TCP-cysteine composite released the highest amount of calcium and inorganic phosphate, while TCP-lysine released the highest amount of amino acid. The data obtained suggests that the addition of lysine to TCP provides a more continual release of composite components.

Board B @ 10:00 a.m. ASSOCIATION OF PLASMA FIBRONECTIN WITH BLOOD TRANSFUSION AND IN VIVO DESTRUCTION OF INCOMPATIBLE ERYTHROCYTES. T.K. Hathaway and J.L. Adams. Medical Technology Department, Bowling Green State University, Bowling Green, Ohio, 43403

Immune clearance and destruction of red blood cells (RBC) following infusion of incompatible blood have generally been thought to involve the opsonic proteins: immunoglobulins (IgG, IgM) and complement. Hemolytic transfusion reactions (HTR) were induced in three mongrel dogs by infusing heterologous RBC. Plasma hemoglobin (PHb), plasma fibronectin (PFN), IgG, IgM, and complement (C3) were measured to assess the HTR. Immediately following infusion of RBC, PHb levels rose to [illegible] PFN, IgG, IgM, and C3 levels declined, all returned to original levels within 48 h. RBC collected at timed intervals before and after the infusion were viewed by fluorescent and electron microscopy; FITC and colloidal gold labeling techniques were utilized, respectively. Using both immunocytochemical techniques, PFN, in addition to IgG, IgM, and C3, was identified on the transfused RBC surfaces. Serum levels of PFN and amounts of fibronectin on transfused RBC presented an inverse relationship. The exact role of PFN in immune clearance and destruction of RBC and its association with other opsonic proteins are yet to be understood; continuing investigations are underway to further examine these significant findings.

Board C @ 10:00 a.m. INJECTIONS OF CORTICOSTERONE INTO C57BL/6 MICE LEADS TO ENHANCEMENT OF RESPONSIVENESS OF SPLENIC LYMPHOCYTES TO MITOGENS. Jill A. Kreiling, Lynda M. Quick, and J. Ross Stevenson, Department of Biological Sciences, Kent State University, Kent, OH 44242

When mice were injected with corticosterone as part of a study comparing effects of different hormones on lymphocytes, the hormone seemed to have a different effect on separated B and T lymphocytes than on unseparated cells. To explore this phenomenon further, we used different doses of the hormone and different injection schedules. Spleen cells were separated into "T cell" (T-enriched) and "B cell" (B-enriched) fractions by passage through a nylon wool column and by treatment with anti-Ig antibody plus complement or anti-Thy 1.2 plus complement. Whereas a daily injection for 7 days of 100 µg of corticosterone per kg body weight decreased the ability of both "T cells" and unseparated cells to respond to mitogens, 250 µg/kg given on alternate days for one week resulted in increased responsiveness to mitogens of both "T cells" and unseparated cells. Neither injection regime significantly affected responsiveness of separated "B cells".

Board D @ 10:00 a.m. RESISTANCE MECHANISMS IN EXPERIMENTAL ALLERGIC ENCEPHALOMYELITIS. C.Pelfrey, F.Waxman and C.Whitacre. Ohio State Univ., Dept. of Med. Micro. and Immunol., Columbus, Ohio 43210.

Experimental allergic encephalomyelitis (EAE) is a cell mediated autoimmune disease of the central nervous system (CNS) that is studied as a model for Multiple Sclerosis. EAE is inducible in Lewis rats with myelin basic protein (MBP) and adjuvant. A substrain of Lewis rats (Lewis resistant or LeR) were found to be resistant to EAE (Waxman, et al, J.Exp.Med. 153:61, 1981). LeR resistance was shown to be mediated by cells of the hematopoietic/immune system, since bone marrow (BM) chimeras (LeR-- Lewis) were resistant to EAE. Mixed cell chimeras (spleen, thymus, BM) showed that LeR spleen cell populations were critical to the transfer of EAE resistance. A comparison of in vitro proliferative responses showed that both Lewis and LeR lymph node cells (LNC) proliferated equally to MBP. Moreover, no differences in interleukin 2 (IL-2) secretion in response to Con A stimulation were observed. In addition, equivalent delayed hypersensitivity responses to MBP were elicited in Lewis and LeR rats. MBP-specific T cell lines from Lewis rats proliferated more vigorously than did LeR T line cells. Similarly, Lewis antigen presenting cells (APC) were more effective stimulators of proliferation than LeR APC. These data suggest a defect in the LeR rat at the level of antigen presentation, possibly associated with differences in class 2 major histocompatibility complex recognition structures.

Board E @ 10:00 a.m. THE BENEFICIAL ROLE OF COPPER ASPIRINATE IN RAT HEART PRESERVATION. M. Fatholahi, M.Azodi, H. Dollwet, D. Ely. Biology Dept., Univ of Akron, Akron OH 44325

Isolated hearts during periods of ischemic preservation show varying degrees of tissue necrosis due to the forma-

tion of damaging free radicals. The hearts of male spontaneously hypertensive rats (6/group) were isolated and perfused with either Krebs-Henseleit (K-H: controls); or K-H plus copper aspirinate (CuA); K-H plus CuA plus catalase (Cat), at 37°C and paced at 240 beats/min. Myocardial function (systolic and diastolic pressure) was recorded initially and after one hour of preservation at left ventricular end diastolic volumes of .05-.3 ml using a balloon catheter. The results after 60 minutes of perfusion in percentage compared to the initial pressure:

	Controls	CuA	CuA+Cat
Diast. Press (%) at .3 ml vol.	163 ± 20	110 ± 16	120 ± 10
Syst. Press (%) at .3 ml vol.	77 ± 6	87 ± 5	86 ± 2
Lipid peroxidation (%)	*100 ± 10*	*75 ± 7*	*75 ± 7*

In conclusion, hearts treated by antioxidants showed better function and lower lipid peroxidation. Treatment with CuA was the most effective step in maintaining good cardiac performance by keeping diastolic pressure lower *(less stiffness) and maintaining normal systolic pressure.*

Board F @ 10:00 a.m. BODY COMPOSITIONS OF YOUNG ADULT HUMAN MALES. Kimberly A. Thomford, Augusta Askari, Neil R. Thomford, Ronald H. Birkhahn. Medical College of Ohio, Dept. of Surgery, Toledo, Ohio 43699.

Body compositions of males at different ages were compared. Men were randomly selected and grouped by age: Group I (n = 5) was aged (A) 16-20 years; Group II (n = 7), A = 21-25; Group III (n = 9), A = 26-30; Group IV (n = 6), A = 31-35; Group V (n = 5), A = 36-40. Body composition was measured by bioelectrical impedance. Body mass index (BMI) was calculated from kg body weight divided by height (in meters) squared. Metabolic rate (MR) was calculated as [kg lean body mass (LBM) multiplied by 23 plus 500] divided by kg weight. Kcalories resting metabolic expenditure (RME) were calculated using the Harris-Benedict equation.

Group	BMI	MR	%Fat	%LBM	%H_2O	RME
I	20.7	31.9	14.3	85.7	63.4	1745
II	23.6	31.3	17.1	82.9	61.2	1846
III	24.7	30.8	20.5	79.5	58.1	1882
IV	23.9	31.6	19.9	79.9	58.6	1730
V	27.6	30.7	22.8	77.2	57.2	1882

Statistical analysis of these mean values indicates that healthy human males do not undergo significant alterations in body composition prior to middle age.

Board G @ 10:00 a.m. INCREASE IN AMPHOTERICIN B RESISTANCE IN FUNGI ISOLATED FROM SELECTED CANCER PATIENTS, 1974-1986. J.M. Boyer, Ph.D. Research Director, Aultman Hospital, Canton, Ohio 44710.

For a period of twelve years, fungal isolates were tested for Amphotercin B susceptibility using a standardized procedure developed by the author. The isolates tested came from cancer patients at various hospitals in Philadelphia, PA. At least 100 isolates of various species and genera were tested each year except 1974, when only 27 were tested. A rapid increase in resistance was observed with Candida tropicalis from a low of 12% resistance in 1975 to 41% in 1983. Candida albicans was seen to remain at a resistance rate of about 20% throughout the test period. Other fungi were found to be less resistant to the test agent throughout the period. In vitro tests conducted on fungal isolates which were resistant to the test agent were found to contain a sterol not present in Amphotericin B susceptible isolates. This new sterol was shown to be 22-dihydroergosterol. The percentage of the new sterol varied with different isolates but was always in inverse proportion to ergosterol. All other lipid fractions tested remained relatively constant in resistant and non-resistant isolates. There is evidence suggesting that the sterol changes observed are directly related to Amphotericin B resistance and are due to exposure to certain anticancer agents. These anticancer inducers appear to vary with each genus tested.

SECTION F. GEOGRAPHY
Morning Session - Room 2186 Founders Hall
Saturday, April 30, 1988
Leonard G. Peacefull, Presiding

9:00 EXISTENCE OF A 20-22 YEAR CYCLE IN TOTAL ANNUAL VOLUME OF U.S. PRECIPITATION, 1886-1971.
John F. Wing, Department of Psychology, Wittenberg University, Springfield, OH 45501

It is now accepted that a 20-22 yr drought cycle exists in the Great Plains, which may be due to the combined effects of the 22-yr Hale solar cycle and the regular 18.6-yr lunar tidal cycle. Yet there has been no evidence of a 20-22 yr cycle in total annual volume of precipitation over the entire continental U.S. This study provides evidence of such a cycle. Using contingency periodogram analysis applied to Marshall's (1976) areally-weighted average precipitation of the continental U.S. for 1931-1971, there appeared significant ($p<.05$) cycles of 3, 10 and 20 years. Furthermore, when the analysis was applied to Marshall's data combined with the earlier comparable calculations of Kincer (1941), there appeared significant ($p<.005$) 21-yr and 42-yr cycles in the 86-yr record. Since these data represent the total "annual bucket" distributed (albeit unevenly) over the entire U.S. it is clear that a 20-22 yr signal must be strong enough at a sufficient number of stations to emerge in the areally-weighted total.

9:15 A CLIMATOLOGY OF PASQUILL-GIFFORD VERTICAL AND HORIZONTAL STABILITY CLASSES FOR THE MID-OHIO RIVER VALLEY

Ronald Isaac
Ohio University
Athens, Ohio 45701

Pasquill-Gifford stability classes are a major determinant of the rate of dispersion of an accidental chemical spill. In this study a compaison is made between observed frequencies of horizontal and vertical stability classes for the mid-Ohio river valley and those reported in Tennessee. The analysis shows that the values for Ohio have a "U" shape in their distribution with excessively large values for very unstable values and very stable values. These discrepancies are not real but are a reflection of the computer modelling system which is used to plan emergency response strategies. Suggestions are presented to improve the validity of the modelling system and in turn the efficacy of the emergency response.

9:45 A SNOW MELT CLIMATOLOGY OF CLEVELAND, OHIO
Dennis J. Edgell and Thomas W. Schmidlin
Geography Department, Kent State University
Kent, Ohio 44242

Snowfall and snowcover records have been kept for the Cleveland area since 1871. However, these records do not accurately indicate how much actual liquid water is held in the snow cover at a given time. The amount of potential snow melt water cannot be accurately estimated from these records alone. Furthermore, the old "rule of thumb" that ten inches of snow should equal one inch of liquid snow melt water is often not factual or applicable.

It is desirable to know the true snow melt water equivalent for applications in hydrology, engineering, agriculture and environmental planning. The National Weather Service began recording a snow melt water equivalent record for the Cleveland area at the Hopkins Municipal airport beginning in 1952. The Climate records for the Cleveland snow water equivalents were obtained from Climatological Data, Ohio for the winters 1952-53 through 1986-87, and were analyzed.

It was found that the greatest snow water equivalents occur during the month of February, especially during the early and middle parts of the month. Also, the probability of a rapid melt of water held in the form of snow from sudden increases in temperature or rainfall is highest in mid February.

The climatology of Cleveland snow water equivalents should be representative of the north-central Ohio region. It is hoped that this analysis will prove helpful for flood assessment.

10:00 A SUMMARY OF SURFACE TEMPERATURE CHANGE AT OXFORD, OHIO FROM 1945 to 1982.
Denis Mullally 325 W. High St., Oxford, OH 45056-1752

Longitudinal studies of surface temperature change in the northern hemisphere have shown specific regional trends for the continental U.S. and Canada since the 1940's.

Daily minimum and maximum surface temperatures for Oxford, Ohio (39° 30'N.; 84° 44'W.) have been recorded since 1945. Annual temperature means for this location were computed by taking the average of the daily means (minimum + maximum/2) for each year. Least squares linear estimates for these values reveals a temperature decrease at the surface of 1.04° C. from 1945 to 1982.

In this study the surface temperature variability was linked to measurement of the standard deviation of temperature from the mean. It was found that this value for annual maximum temperatures was greater than that for annual minimum temperatures by 1.38° C. Also, the standard deviation for annual minimum temperatures showed an increase from 1945 to 1982.

The trends shown in these surface temperature values are generally consistent with those at other eastern U.S. locations. However, further studies such as this of synoptic climate data gathered over time will increase scientific understanding of changes in this component of the natural environment.

10:30 VIOLENT TORNADOES IN OHIO, 1950-86. Thomas W. Schmidlin, Geography Department, Kent State University, Kent, Ohio 44242.

There were 476 tornadoes in Ohio during this period. Fourteen (3%) of these were violent with wind speeds over 330 km/h. The violent tornadoes accounted for 25% of the total tornado path length, 67% of tornado injuries, and 78% of tornado fatalities. All but one of the violent tornadoes resulted in casualties in Ohio with an average of 200 injuries and 10 fatalities per tornado. The violent tornadoes had a median path length of 50 km and a median width of 360 m, far larger than the typical Ohio tornado path length of 2 km and width of 70 m. Six of the 14 crossed state lines. The peak month of tornado activity in Ohio is June but 12 of the 14 violent tornadoes occurred in April. All violent tornadoes touched down between 2 PM and 11 PM EST.

10:45 Physical and Cultural Landscapes Found on Greeting Cards. Jeffrey J. Gordon. Geography Department, Bowling Green State University, Bowling Green, OH 43403-0217.

This research was initiated by the interesting fact that some greeting cards incorporate illustrations of various landscapes, real and imagined. A sample was viewed to: 1. list, describe, and classify the individual landscape elements portrayed (e.g., terrain, flora, fauna, weather, climate, edifices, people and activities). 2. tabularize the relative proportions of these elements and types, and classify them by landscape categories (e.g., desert, forest, summer, winter, urban, fishing, pastoral, mythic) to determine typical greeting card categories. 3. analyze and interpret these commonly found landscapes to determine the images of place they reflect and the moods they evoke from the viewer. Not surprisingly, perhaps, the findings show that greeting card landscapes have common characteristics such as being attractive, pleasant, restful, and idyllic. Such landscapes are positive and enjoyable to view. Potentially visually upsetting landscape elements (e.g., snake, tornado, hunting) occur, but are softened by a non-threatening portrayal such as a cartoon or comic image.

SECTION F. GEOGRAPHY
Afternoon Session - Room 2186 Founders Hall
Saturday, April 30, 1988
Jeffrey Gordon, Presiding

1:30 SECTION BUSINESS MEETING

2:00 CHANGES IN THE FUNCTIONAL SPECIALIZATION OF OHIO'S SMALL URBAN AREAS, 1950 TO 1980. David T. Stephens. Geography Department, Youngstown State University, Youngstown, OH 44555.

This study employes techniques used by Nelson in his classic article, "A Service Classification of American Cities". However, this paper focuses on Ohio and urban places having populations of less than 10,000. Employment data from 1950 and 1980 are used to identify the functional specializations of non-metropolitan sized urban places. Although manufacturing employment continues to dominate these communities, the results suggest significant shifts have occurred in the importance of that and other employment sectors. The data indicates changes that have occurred in the patterns of economic specialization within the state and documents the development around large central cities of several types of special function suburban communities.

2:15 MANUFACTURING EMPLOYMENT CHANGE IN NORTHWESTERN OHIO. Bruce Smith and John Hiltner. Department of Geography, Bowling Green State University, Bowling Green, OH 43403.

Employment change in manufacturing has been a traditional analytical theme in economic geography. In particular, the erosion of the manufacturing employment base in the Manufacturing Belt has been of concern not only to geographers but also public officials.

The purpose of this paper is to review the various components of manufacturing employment change in selected counties in northwestern Ohio. Furthermore, those shifts are evaluated from the perspective of the product life cycle model and Birch's hypothesis that smaller firms hold the key to the rejuvenation of manufacturing.

In general, the results demonstrated that smaller and younger manufacturing establishments are the main generators of manufacturing employment growth in northwestern Ohio. Nonetheless, the growth of such facilities does not offset the contractions and closings of older and larger manufacturing facilities.

2:30 THE EVOLUTION OF A 1980s INNERCITY HIGHWAY: A CASE STUDY OF TOLEDO'S BUCKEYE BASIN GREENBELT PARKWAY. Henry E. Moon, Jr., Department of Geography & Planning, The University of Toledo, Toledo, Ohio 43606.

Toledo's Buckeye Basin is a local physiographic feature near the center of the central business district consisting of 90.2 acres of primarily undeveloped land, 85.2 acres of which is designated as wetlands. At one time Swan Creek emptied directly into Maumee Bay. With the aid of man-made dikes the stream changed its course to the south, entering the Maumee River through the central business district about five miles upstream from the bay. Ensuing urban development in the basin combined with the placement of several small pumping stations constructed to drain portions of the area actually divided the earlier basin into a number of smaller basins. Since the diversion of Swan Creek, the Buckeye Basin has been partially filled with support material for construction and with industrial wastes via a landfill operation within the basin.

This paper describes twenty years of activity surrounding construction of a new four-lane, median-divided, controlled-access, 3.5 mile highway through the Buckeye Basin - diagramming the planning process. Since its inception in the mid 1960s, this transportation plan has been embroiled in economic, aesthetic, social, and environmental controversy. Construction of the highway began in the Spring of 1987.

2:45 FUNCTIONAL AREAS OF CENTRAL LONDON

Allen G. Noble
Department of Geography
The University of Akron
Akron, Ohio 44325

Over the long course of its history, London has evolved a series of functional areas which are surprisingly distinct and compact for a city of its size and diversity. These districts are best seen in central London, which may be taken as that area within a perimeter defined by locations of the great 19th century railway stations.

Certain urban functions have departed from central London. Perhaps the most important of these has been shipping, which has progressively moved eastward along the Thames, until today it is several miles downstream from central London. The most important and easily identified functional areas which remain are: (1) financial activities, (2) newspaper publishing, (3) political administration, (4) legal activities, (5) arts and entertainment, and (6) retail shopping. Each of these activities occupies a discrete area, but depends upon other functional areas for its persistence. Although most of central London's functional districts are of long standing, a few, such as the Barbican date only from the rebuilding of the city after World War II.

3:00 STATEWIDE GEOGRAPHICAL INFORMATION SYSTEMS IN TRANSITION: *THE CASE OF* THE OHIO CAPABILITY ANALYSIS PROGRAM. Peter F. Fisher, Geography Department, Kent State University, Kent, Ohio 44242, and Michael N. DeMers, Geography Department, The Ohio State University, Columbus, Ohio 43210.

The Ohio Capability Analysis Program (OCAP) was established in the early 1970's, making it among the earliest state sytems. It is therefore remarkable that it has survived, given the demise of many others. OCAP was set up originally to operate under the constraints of the early generation of computer systems, although upgrades have been made continuously. In this paper we will discuss the history of the OCAP, explore the reasons it has survived, and look at the needs of the program to adapt it to the present generation of computer systems.

3:15 IMPROVING CARTOGRAPHIC TECHNIQUE: REPRESENTING GLOBAL EDUCATION AND LITERACY LEVELS BY NATIONS Robert Leddy, Department of Geography, Bowling Green State University, Bowling Green, OH 43403.

A global map that portrays the literacy and education enrollment rates of nations requires that these rates be clearly distinguishable from one another for optimal readability and comprehension. The State of the World Atlas presented a map on which colors as disparate as vermilion, orange, magenta, deep blue, and pale green represented the literacy rate in five classes; and large boxes of a red/blue/green scheme represented the primary, secondary, and tertiary level educational enrollment rates. This presentation contrasts that map with one that represents the same two data sets but is redrawn according to the following format: The education enrollment rate classification is represented by gradations of one color (i.e., green) from intense to pale, emphasizing the interrelatedness of these classes; and the three education enrollment levels are represented by geometric symbols (i.e., circle, triangle, and square) distinguishing the three levels of enrollment. The cartographic aim of this second map is to significantly improve upon the first map by providing the same information in a clearer, less cluttered, more readily comprehensible and visually attractive manner.

3:30 UNDERGROUND GASOLINE STORAGE TANKS AND POSSIBLE ENVIRONMENTAL HAZARDS IN PORTAGE COUNTY, OHIO, HANAFIN, Catherine M., Geography Department, Kent State University, Kent, Ohio 44242.

Underground storage tanks (UST's) are used to store gasoline at service stations and fleet garages. In Portage County there are 436 UST's with a total storage capacity of 2.3 million gallons. The median age of the tanks is 12 years. 86 percent of the tanks are steel and are susceptible to corrosion when placed in certain soil environments. If leakage occurs, the soil, groundwater, and surface water bodies can become contaminated. An analysis of UST characteristics and the soil environments in which these tanks are buried were used in a risk factor assessment to determine which areas in Portage County, Ohio are suitable locations for future UST's. Environmental hazards that could result if leakage occurs were also assessed.

3:45 ECOLOGICAL TRANSECTS: AN ALTERNATIVE METHOD OF LANDSCAPE ANALYSIS Professor John W. Simpson, Department of Landscape Architecture, The Ohio State University, 190 W. 17th Ave., Columbus, Ohio, 43210

Frustration with the inability of overlay-based mapping and analysis techniques to readily depict landscape dynamics led to the development of "ecological transects" as an alternate method of gaining environmental understanding in order to identify landscape design guidelines. Using a 3000 acre regional park located on the banks of the Big Darby Creek as a case study, a limited number of carefully selected transects crossing the site's range of conditions were identified on aerial photographs, then intensive field surveys conducted along their corridors, including identification of soil profiles and formal vegetation sampling, in order to describe the area's current ecological condition, its past evolution, and current state of flux. Results were graphically documented using illustrative boards containing various drawings, sketches, and diagrams, supplemented with supporting text, in order to facilitate communication to clients and the public. Simultaneously, historical research identified the past and current cultural significance of the landscape. In combination, these analyses provided a thorough, first-hand understanding of the site, and have proven to be an exciting, effective alternative to traditional landscape analysis techniques.

4:15 AIDS DIFFUSION AND CHARACTERISTICS Ashok K. Dutt, Department of Geography, The University of Akron, Akron, Ohio 44325 and Hiran M. Dutta Department of Biological Sciences, Kent State University, Kent, Ohio 44240.

The AIDS virus, a retrovirus, mutates five times faster than the flu virus. This makes it difficult to discover a curative drug or a preventive vaccine. Moreover, the origin of this disease is still shrouded in mystery. A West African green monkey virus making a crossover of the species barrier or the existence of the disease at multiple locations in a dormant form are the two most probable theories of origin. It is, however, the central African AIDS reservoir that is mainly responsible for the current spread in the world. AIDS is now a worldwide disease. The incidence rate is very high in Central Africa, while the U.S.A. and West Europe are in an incipient stage of epidemic. It is mainly a disease of homosexual males and IV drug abusers in the U.S.A. and West Europe but is mainly transmitted in central Africa by heterosexuals. The disease can only be controlled by disciplining human behavior in the absence of a drug or vaccine.

4:30 MARINE BOUNDARIES AND GEOPOLITICS IN THE GULF OF FONSECA. Thomas D. Anderson, Department of Geography, Bowling Green State University, Bowling Green, OH 43403.

The study is a descriptive analysis of marine boundary disputes and competing national interests in the Gulf of Fonseca. El Salvador, Honduras, and Nicaragua share frontage on the gulf but an equidistant marine boundary between El Salvador and Nicaragua effectively closes off Honduras from open access to the Pacific. In addition, the deep-water channel that serves the Honduran island port of Amapala and mainland port of San Lorenzo lies between islands claimed and inhabited by Salvadorans. Other geopolitical complications included a history of conflicting boundary claims, recent animosities between El Salvador and Honduras due to the "Soccer War," and support of armed rebels in El Salvador by the Sandinista government of Nicaragua. A map of pertinent locations and differing boundary claims and one of underwater features of the gulf supplement the report.

4:45 CONFUCIAN SOCIAL PHILOSOPHY AND JAPANESE MANAGEMENT: SOME PRELIMINARY THOUGHTS ON FORCES FOR CHANGE. Stephen S. Chang. Department of Geography, Bowling Green State University, Bowling Green, OH 43403.

Japanese management style is a legacy of the Confucian social philosophy that diffused from China. Under this social philosophy, managing a corporation is similar to that of a family. This accounts for the lifetime employment, no lay-offs, dedication and loyalty to the corporation and the hierarchal nature often associated with Japanese business. This management style is common among the elite Japanese corporations. There are numerous small companies whose employees do not have the expectation of security offered by the large corporations.

The familial model of management is expected to face increasing stress from international and domestic forces. Some of these include the appreciation of the value of the yen, protectionist pressures in international trade, internationalization of the national economies, an aging work force, high technology industries and the need for greater innovation. They can cause the need for evaluation of the management system which contributed to Japan's economical success but which may not be able to respond as effectively to the future.

SECTION F. GEOGRAPHY
Poster Session - Adena Gym
Saturday, April 30, 1988

Board F @ 9:00 a.m. SPATIAL ANALYSIS OF HIGH TECHNOLOGY MANUFACTURING EMPLOYMENT IN METROPOLITAN OHIO, CLARKE, Audrey and HOLLY, Brian P., Kent State University, Kent, Ohio 44242.

This study assesses the recent changes in high technology employment in Ohio's Metropolitan areas, forecasts near term changes in high technology employment and evaluates the spatial distribution of high technology employment in light of selected factors thought to influence the location of such activities. These goals are accomplished by measuring the levels and changes in high technology employment within Ohio's MSAs since 1973, using a shift-share model to identify the components of these changes. The paper further projects likely future changes in high technology employment and relates the location of these industries, in terms of employment, to selected MSA characteristics which are thought to be reliable indicators of locational influence. The paper ends with a discussion of the prospects for high technology in mature industrial regions and the policy implications for regional industrial development.

Board G @ 9:00 a.m. THE EVOLUTION OF THE DARBY CREEK LANDSCAPE: A GRAPHIC DEPICTION OF LANDSCAPE CHANGE OVER TIME Professors John W. Simpson and John C. Billing, Department of Landscape Architecture, The Ohio State University, 190 W. 17th Ave., Columbus, Ohio, 43210

This seven panel illustrative wall display, measuring approximately 4'x 11', graphically depicts the evolution of the Darby Creek landscape through geologic time. Developed as a stand alone public educational display, as well as a supplement to other on-going research projects regarding the same area, it attempts to trigger deeper understanding of the landscape's dynamic nature by graphically representing many of the earth's primary physical, biological and cultural processes *on consistent time scales*. The environmental effect of each process is illustrated on a separate time line, all drawn at the same scale, and all aligned in parallel on the display, thus enabling easier visual correlation of their cause and effect relationships. The time lines illustrate biological evolution, cultural evolution, global climate, sea level, glaciation, magnetic pole orientation, natural catastrophies and upheavels, and the deposition and mass wasting of sedimentary deposits. The time lines are supplemented with numerous diagrams and drawings, and by supporting notes. In addition, a set of idealized vignettes illustrate how the Big Darby landscape may have appeared at various, critical stages in its evolution.

Board H @ 9:00 a.m. DESCRIPTION OF AN AERIAL ANOMALY VIEWED OVER COLUMBUS, OHIO. I. Scott, Department of Physiology, Ohio State University, Columbus, Ohio 43210.

On February 23, 1984 at 1600 an unusual aerial object was sighted at 40.00° N and 083.00° W. Five witnesses made written descriptions of the object. The object initially appeared to be cone-shaped with its apex oriented upward. During the initial few minutes of the sighting, the cone appeared to be surrounded with a fog. Its base was a bright area. Approximately every 60 seconds during the 20 minutes that the object was viewed, it passed through a regularly timed cyclic appearance change. In one phase of this cycle, the object appeared as a distinct rectangle, and in another phase of the cycle it became nearly invisible. It appeared to drift several miles to the northeast during the period of observation. The ground wind velocity was reported to have been 0. After a search at Port Columbus, it was reported that the object was not seen and was not detected by radar. Other aerial anomalies were reported later in the day by different observers. The object could not be explained as a natural source, balloon, or known aircraft.

SECTION H. SCIENCE EDUCATION
Morning Session - Room 2095A Founders Hall
Saturday, April 30, 1988
David Lewis, Presiding

9:00 PRESERVICE PERSONAL TEACHING EFFICACY IN MICRO-TEACHING SUCCESS: INITIATING A DISCUSSION. Mary Ann Flowers, and E. Jean Harper, 2890 Mogadore Road 20A, Akron, Ohio 44312

The need to improve teacher education programs has been a focus of concern for advocates of the 1980's Educational Reform Movement. Responses to the need for teacher education improvement are as diverse as the experts and advocates themselves. A teacher's sense of efficacy has been positively related to affecting student learning. Because most research dealing with the area of teacher efficacy has been conducted with experienced teachers, this research was conducted with preservice teachers in the clinical setting of microteaching regarding their sense of personal teacher efficacy.

The problem investigated was as follows: the relationship between personal teaching efficacy and microteaching success in initiating a discussion was examined. The investigation included looking at the relationship between demographics such as sex, age, grade point average (GPA), class rank, (freshman, sophomore, junior, senior, or post baccalaureate), and teaching speciality and the personal teaching efficacy of preservice teachers in microteaching success.

Research in the area of teacher efficacy at the preservice teacher level may better serve educators in teacher education to identify problems to develop intervention strategies with this population.

9:15 THE GREAT LAKE ERIE: AN INTERDISCIPLINARY REFERENCE TEXT FOR EDUCATORS. Victor J. Mayer and Rosanne W. Fortner. Department of Educational Studies, The Ohio State University, 1945 N. High St., Columbus, Ohio 43210.

Fifteen experts in the sciences, geography, history, economics and resource management have combined their efforts to produce a reference text for educators and media communicators. Funded by The George Gund Foundation of Cleveland, The Great Lake Erie contains over 150 pages of information about the importance of the Lake in the development of Ohio, the economy and culture of the continent, and the lifestyle of those who live in the region. Several chapter authors will be on hand at the Academy's Annual Meeting to discuss their work and the anticipated uses of the book.

9:30 Operation Bluebird: An ODNR Funded Nongame Wildlife Project. Robert E. Rohrbaugh, Jackson Memorial Middle School, 7355 Mudbrook Street, N.W., Massillon, OH 44646.

During the Spring of 1987 approximately 300 Jackson Middle School seventh grade science students and several Jackson High School industrial arts students were involved in making the nesting season for the Eastern Bluebird in northern Stark County potentially more successful by constructing suitable nesting boxes.

Not so many years ago bluebirds were a common sight in Ohio. But, due in part to a decrease in their natural nesting cavities such as dead trees and wooden fence posts, their numbers have drastically declined. The nesting boxes, designed specifically for the Eastern Bluebird, were constructed in an attempt to provide artificial nesting cavities.

Thanks to citizen contributions through the "Do Something Wild!" checkoff option on the state income tax return form, Jackson Local Schools received $1,409 from the Ohio Department of Natural Resources. "Operation Bluebird" was one of 25 nongame and endangered wildlife projects approved for funding during 1987.

9:45 A SIMPLE TECHNIQUE FOR THE TRANSFER OF PLASMID DNA BETWEEN SPECIES OF BACILLUS. Spencer E. Reames. Benjamin Logan High School, Box 98 (Logan Co. Rd #5), Zanesfield, Ohio 43360.

Biotechnology techniques are often difficult to demonstrate at the high school level due to the lack of specialized equipment. A potentially important, yet very simple, method of transferring plasmid DNA between members of the genus Bacillus can be conducted without any specialized equipment.

Bacillus thuringiensis is a bacterium which produces a crystal protoxin (the delta-endotoxin) upon sporulation. This protein crystal is solubilized and converted to toxic subunits in the midgut of certain lepidopterous insects.

The gene coding for this protein crystal is carried on a plasmid. This fact makes the gene available for transferal by a simple mating technique.

The mating technique for the transferral of the plasmid from B. thuringiensis HD-73 to B. cereus W6A1 will be described. The method of demonstrating the transferal will also be decribed. The protoxin crystal can be demonstrated by the method of Smirnoff in which napthol blue black is used as the primary stain and basic fuchsin is used as the counterstain.

10:00 EXPERIENCES OF WINNERS OF 1986-87 BATTELLE AWARDS FOR PROFESSIONAL DEVELOPMENT. Science Department Winner: George Collins, Marlemont HS, 3812 Pocahontas Ave., Marlemont, OH 45227; Mathematics Teacher Winner: Dennis M. Rose, Pioneer Joint Vocational School, P.O. Box 309, Shelby, OH 44875; and Science Teacher Winner: Richard D. Benz, Wickliffe HS, 2255 Rockefeller Rd., Wickliffe, OH 44092.

Battelle Awards for Professional Development are provided by Battelle Memorial Institute, in cooperation with The Ohio Academy of Science, to stimulate and recognize excellence in science and mathematics education in grades 7-12 in Ohio schools. Marlemont faculty used their $5,000 award to spend a week at Oak Ridge National Laboratory to study aquatic ecology, instrumentation, earth sciences, energy systems and space applications. Dennis Rose used his $2,500 to study the use of statistical process control (SPC) methods in American and Japanese industry by visiting several manufacturing plants in the United States. Richard Benz used his award of $2,500 to attend an international meeting in Quebec, to attend a workshop on biotechnology in Arlington, Virginia, and to observe researchers at the world famous Jackson Laboratory in Maine. He produced a videotape of his experiences. These award winners will discuss how their experiences enhanced their professional development.

SECTION H. SCIENCE EDUCATION
First Afternoon Session - Room 2095A Founders Hall
Saturday, April 30, 1988
Bob Rohrbaugh, Presiding

1:30 SECTION BUSINESS MEETING

2:00 IMPLEMENTING MICRO-PROCEDURE IN CHEMISTRY LAB.-AN ASSESSMENT. Pei-Hsing Lin Wu, Grandview Hts.High School, 1587 W.3rd Ave.,Columbus OH 43212

With growing concern on lab safety and the impact of chemical wastes on the environment micro-scale experimentation becomes an important alternative to macro-technique.

For the past year, micro-procedure has been integrated into our chemistry curriculum. This program was promoted at workshops at Woodrow Wilson-Dreyfus Foundation Institute for chemistry teachers. It offers safe and economical ways to carry our experiments.

Except for the high initial expense for the size of our school, we have found that micro-procedures offer many advantages over the macro. Quantitywise, chemicals used are at least 30 times less that than of the macro as drops are used instead of milliliters. Thus, there is less impact on environment. Micro procedure offers reduced cost for expandable items; less time for preparation; less storage space; shorter experimental time; better opportunity for students to do repeats; more time for post lab discussions. Because of the small size, the entire demonstration can be performed on the platform of an overhead projector.

By adding micro-procedure into our regular laboratory work, we are able to enhance the hands-on experience. Equipment, products and resources will be shown and discussed during my presentation.

2:30

DREYFUS DEMONSTRATIONS THAT MOTIVATE AND TEACH STUDENTS C.L. Schrader, Rebecca Stricklin, Ed Escudero, Frank Huss, Ginger Tannenbaum, Dover High School, Dover, Ohio 44622

Demonstrations that motivate student, delight the eyes of the beholder and generate student thinking will be presented by Dreyfus Master Teachers 1982-1987. Each demonstration will be fully explained and a handout with directions for preparing the materials, performing the demonstration and disposal will be provided.

Research shows that there is a big difference between what students see and understand when a demonstration is performed and what we hope they will observe and learn from the experience. Many demonstrations are just flashy and may appear to students as "magic". Magic is the failure of the mind to discern a reasonable explanation for an event based on known facts and principles and is therefore antithletical to science. We will try to show you how to use demonstrations that are exocharmic, can be analyzed by students, and which will illustrate and help you teach important science concepts .

SECTION H. SCIENCE EDUCATION
Second Afternoon Session - Room 2096 Founders Hall
Saturday, April 30, 1988
Marion Moeckel, Presiding

2:00 SOURCES OF INFLUENCE ON GIRLS' INTEREST IN SCIENCE CAREERS. Nadine K. Hinton and Joseph Hecker, 242 Townshend Hall, 1885 Neil Ave., Columbus, Ohio 43210.

Fifty females (grades 7-12) who attended Women in Science career development programs completed questionnaires on their interest in science careers and perceived sources of influence on career interests and decisions. Their responses were compared to those of control males and females who attended the same schools. Participating and control females did not differ from control males in number of science and math courses taken and planned. Females indicated significantly higher interest in science careers (summed across 20 careers). Different patterns of perceived support for career interests and decisions were reported by males and females. Parents were most frequently listed, followed by teachers, although the exact percentages differed considerably among the three groups (control males and females and participating females). The third most frequently mentioned source for males were siblings/relatives, while control and participating females listed other adults (including several anecdotes about participation in WIS programs). This research, which supports earlier reports that females' interests in nontraditional careers are influenced by sources outside the family, underscores the importance of supportive science teachers who are informed about science careers in influencing students' (especially female students') career interests.

2:15 SCIENCE ALLIANCE - YEAR 2 - LEAH KLUSCH, ALLIANCE CITY SCHOOLS, 200 GLAMORGAN STREET, ALLIANCE, OHIO 44601

The Science Alliance program is designed to stimulate individual research thought and research project involvement in students grades 6-12. The development of a system wide program is in its second year. A pilot program with sixth grade students was initiated this year to provide comprehensive information and individual assistance to students at an introductory level. Middle school and high school science students have shown increased interest in project involvement. Enthusiasm for competition at our local science fair as well as state wide and national focus has grown significantly. Teacher involvement has increased and parent and community support is being fostered to support the program. The focus of the Science Alliance program in our district is on all science students recognizing the fact that many talented science minds are hidden in the larger group of average students. The broad based nature of our program makes it unique for a district of our size.

2:45 EXPERIMENTAL DESIGN AND THE SCIENCE FAIR PROJECT. Arthur L. Vorhies, Box 629-OUC Chillicothe, OH 45601

Science fair projects have become increasingly popular targets for those critcizing the "decline of science education today." While much of this criticism is probably overstated, one of the problems that needs to be addressed regarding science fair projects is that of experimental design. Too few students, and in some cases teachers, do not seem to understand how the experimental design differs from other designs such as investigations or demonstration. I will present and discuss the requirements for a true experiment. Namely:

1. Random selection/assignment.
2. Presence of at least one true independent variable.
3. Presence of at least one dependent variable.

Appropriate statistical tests will be mentioned as needed. The concepts of scientific reliability and experimental validity will be presented. Examples of experiments, investigations, and demonstrations will be used to explain that while any method may be useful in research; the researcher should know what technique is being used, and be able to explain what is being done in the project, and why.

3:15 AN EMPERICAL ANALYSIS OF THE RELATIONSHIP AMONG TEACHER PERCEPTION OF THEIR ROLE IN CURRICULUM DEVELOPMENT, THE SCHOOL CULTURE & DEMOGRAPHICS. E. Jean Harper and Mary Ann Flowers. The University of Akron. College of Education. Akron, OH 44325.

During the early 1980s, public school became the target of public criticism and attach. In response to the surge of national reform reports in 1984, a group of representatives from Northeast Ohio educational institutions accepted the challenge to improve the job they were doing in educating youth. The resulting coalition for the High School for the Future (HSF) was comprised of two four-year higher educational institutions, a community college, and five high schools located in five different school districts. The five schools were comprised of urban, suburan and one rural high school. The coalition was formed to spearhead school-based reform in the five local high schools by providing leadership and research-based guidance.

The purpose of this study was to examine and clarify whether teachers in the five high schools share a common view of their role in curriculum development for the HSF and to determine th influence of the school culture and demographics on the teachers role in curriculum development. Measures of the school culture, demographic, and curriculum development variables were used to determine the relationship between the dependent and independent variables. The research design used to test the hypotheses was multiple linear regression. Models based upon the research quesitons were written and all statistical results are reported in p-values. The population for this study was 262 teachers who held teaching positions during the 1986-87 school year in HSF. Research in this area will assist administrators and curriculum specialist in developing alternative, realistic plans for involving teachers in curriculum.

3:30 SANITY FROM RADON RABIDITY. Morris Leland Martin,157 Griswold St., Delaware, Ohio 43015.

Tales and traces of the radon family are quaking American foundations, including the media's mirrors in outer space. Before a fade of this fad for domestic fright, science educators can fling open realistic doors for weighing and leashing environmental hazards.

As an experienced health physicist, the author's friendships with pioneers of radiation progress and victims of ionizing insults have confirmed his belief that America's science curriculum suffers from stunted growth.

To bait missioners for a miraculous recovery, the author will gift each participant with a radiation monitor, and useful, deactivated radiation devices will be demonstrated.

4:00 SEXUAL HARRASSMENT: A COMMON PROFESSIONAL PROBLEM. Judith B. Moody, Battelle Memorial Institute, 505 King Ave., Columbus, OH 43201

Sexual harassment consists of verbal or physical conduct of a sexual nature derived on the basis of sex. This behavior is imposed by a superior to an employee or student, as well as, peer-group colleague interactions. Sexual harassment may be described as generalized sexist remarks or behavior; inappropriate and offensive, but essentially sanction-free, sexual advances; solicitation of sexual activity or other sex-linked behavior by promise of reward; coercion of sexual activity by threat of punishment; and physical assault. In order to deal with sexual harassment, a person must obtain knowledge of: (1) what harassment is, (2) how organizational guidelines deal with harassment, (3) how to communicate directly with the harasser, and (4) how to obtain the necessary help in coping with the problem. The greatest difficulties in dealing with sexual harassment are personal anguish, uncertainty about a person's professional future, lack of personal and professional support, and costliness of legal litigation. Resolution of this problem requires acceptance that sexual harrassment exists and a willingness to deal with it by parents, teachers, organizational directors, and professional colleagues. Women in science and engineering need this problem dealt with, today!

SECTION H. SCIENCE EDUCATION
Poster Session - Adena Gym
Saturday, April 30, 1988

Board I @ 9:00 a.m. A REPORT ON A USDE FUNDED GRANT IN SCIENCE AND MATH EDUCATION FOR NORTH-WEST OHIO SCHOOL TEACHERS

Dr. Evan McFee, Bowling Green State University, Bowling Green, Ohio 43403

This is a presentation to describe the implementation of a grant entitled "An Integrated Program To Enhance The Teaching Skills Of Mathematics And Science Teachers". This program included a three week summer workshop to improve teachers qualifications and skills in the fields of mathematics, science, and computer learning. In addition to the workshop, an academic year field-based, inservice component was provided. Also a nucleus bank of computer software/courseware was established for use and interchange among the participant teachers. The goals, rational, and outcomes of the program will be given during this presentation.

SECTION I. ANTHROPOLOGY AND SOCIOLOGY
First Morning Session - Room 2084 Founders Hall
Saturday, April 30, 1988
Jonathan Bowen, Presiding

9:00 SHELL MINERALOGY: A MEANS OF DISTINGUISHING MARINE AND FRESHWATER ARCHEOLOGICAL SHELL MATERIALS. KOVACH, Jack, Department of Geology, Muskingum College, New Concord, Ohio 43762.

The occurrence of marine shell materials at archeological sites that are far inland has obvious implications in the overall evaluation of such sites and of the prehistoric peoples who occupied them. However, in the manufacture of ornaments (e.g., shell disc beads) or tools by prehistoric man from the shells of bivalved molluscs, the original shells have often been so highly altered in shape as to preclude identification of the species utilized, thereby also precluding determination of whether the shells were of marine or nonmarine (presumably local) provenience. The distinction between marine and nonmarine bivalve shell fragments can sometimes be made on the basis of the mineralogy of the shells. The shells of freshwater clams (the Unionidae) are composed entirely of aragonite whereas the shells of marine clams are composed of aragonite and/or calcite. The presence of calcite in an artifact fashioned from a piece of bivalve shell would, therefore, be unequivocal evidence of a marine origin of the shell. The standard technique for distinguishing calcite from aragonite is X-ray powder diffraction, which, unfortunately, requires pulverization of the sample. The use of Feigl's solution, however, provides a nondestructive technique for distinguishing calcite from aragonite in archeological and other materials.

9:15 TIME PERCEPTION AS A HEALTH INDICATOR DURING FAMILY/NURSE INTERACTIONS
Pamela L. Bonnett & Joanne M. Marchione
College of Nursing, The University of Akron
Akron, OH 44325

The purpose of this study was to explore the meaning of the experience of time during nurse/family interactions as a health-related activity. How family members perceive time passing during a family/nurse interaction is of theoretical interest to nurses, as well as to others in the social sciences. Newman (1986) defines health as expanding consciousness. The amount of time perceived to be passing during an interval may be an indicator of health. When the personal experience of time passing (subjective) is greater than actual clock time, expanded awareness (consciousness) of the interval has occurred. The convenience sample was drawn from families seeking health services at a nurse-managed health center within a Northeastern university. Family was defined as one or more individuals with kinship ties. Data was collected using a guided interview. Subjects consenting to participate were asked to describe their lived experience of time during a selected nurse/family interaction. The outcome of this research was an understanding of a family member's personal experience of time perception in relation to health.

9:45 THE EXCAVATION OF ROCKSHELTER 33SC282, BLOOM TOWNSHIP, SCIOTO COUNTY, OHIO. Dennis Kleinman, 1733 7th St., Portsmouth, Ohio and Jonathan E. Bowen, 419 Sandusky Ave., Fremont, Ohio 43420.

Rockshelter 33SC282 is located in the uplands of the unglaciated plateau about 13 km northeast of the Ohio River on the divide between the Frederick and Pine Creek drainages in Scioto County, Ohio. Although only the Late Archaic and Early Woodland components yielded substantial faunal samples, Early Archaic, Chesser Late Woodland, and Feurt Fort Ancient components are also present. Preliminary analysis of the Late Archaic floral/faunal sample suggests at least a late fall and early spring occupation. Two radiocarbon dates, 1510±80 B.C. (Beta-19812) and 1780±90 B.C. (Beta-19813), were obtained from the top and bottom of the Late Archaic level, which contained a three-quarter grooved axe and a McWhinney Heavy Stemmed point. Elk are conspicuous by their absence in both the Late Archaic and Early Woodland faunal samples.

10:00 WELFARE REFORM: A SYNTHESIS OF ADMINISTRATIVE PROBLEMS. Colleen M. Rohrer, U.S. General Accounting Office, Suite 350 Plaza Nine, 55 Erieview Plaza, Cleveland, Ohio 44114

We analyzed 42 Congressional reports on administrative problems identified in welfare programs. We identified 43 different problems in 27 of the 42 reports. This paper summarizes the nature of the administrative problems reported to the Congress for the period October 1984 to August 1987. Our summary centers around seven major groupings as follows: (1) staffing, (2) monitoring, (3) reporting, (4) coordinating, (5) funding, (6) regulating, and (7) automating.

Federal and state oversight is inadequate and passive. States limit their roles to acting as conduits for data and funds between federal and local agencies. Also, some federal policymaking and regulating agencies' monitoring of agency compliance is substandard. In addition, poor case management and insufficient case tracking and monitoring systems by local agencies caused cases to not be referred and open cases left unattended too long.

Enforcement agencies lacked sufficient staff to adequately carryout their responsibilities. As a result, services were constrained and enforcement actions delayed. In addition, program delays resulted when welfare staff had trouble adjusting to new tasks for which they were not trained. This paper will elaborate on these and other problems identified.

10:15 THE THEBES PHENOMENON IN THE MIDWEST REGION: CULTURAL DRIFT OR POPULATION MOVEMENT? Tim Abel, Laboratories of Ethnoarchaeology, The University of Toledo, Toledo, Ohio 43606.

The Thebes Cluster has been defined by various authors for the region encompassing the midwest. Examples of this very distinct lithic biface type are to be found in nearly every amateur and institutional collection which exists for this region. Yet, the origins and temporal placement of this biface type are poorly understood. An in-depth analysis of this Thebes "phenomenon" in the midwest region, involving documentation and statistical metric analysis, has shed new light on these problems.

10:30 SEX EDUCATION IN THE 20TH CENTURY. Carol Blanchong, Sunny Chung, Sandy Kwac, and Laura Williams, Box 29, Fletcher Hall, Kent State University, Kent, Ohio 44243.

What are the major changes in the content of sex education in the years 1900-1985 in the United States? A content analysis was conducted on a sample of books on sex education at the Kent State University Library. Available books were randomly sampled according to the following time periods: 1900-1920 (N=9); 1921-1940 (N=20); 1941-1964 (N=9); and 1965-1985 (N=12). The content analysis showed that: 1) Sex was considered taboo during the early twentieth century, 2) Sex education in the early part of the century emphasized a moral philosophy and sex only as a means of reproduction, 3) In the latter portion of the century sex education stressed scientific knowledge of sex and the pleasures involved with sex relations, and 4) Overall, sex education in the twentieth century changed from being vague and ambiguous to clear and informative.

SECTION I. ANTHROPOLOGY AND SOCIOLOGY
Second Morning Session - Room 192 Founders Hall
Saturday, April 30, 1988
William Laurie, Presiding

9:00 MODELING AND CONTENT ANALYSIS: INSIGHTS INTO SOCIAL PROGRAMS. William Laurie, 15787 Forest Hills Blvd., East Cleveland, Ohio 44112

For the White House Conference on Aging in 1980, we modeled a three dimensional analysis of needs of the elderly in 50 states. We demonstrated that its possible to use a conceptual model to analyze content of over 2,000 needs statements. We are experimenting with other analytical techniques to summarize across congressional reports on social programs.

This paper discusses our approach to summarize data on reports relating to welfare programs. We analyzed 42 congressional reports issued in fiscal years 1985-1987. We identified first the administrative problems in welfare programs and then used a criteria, cause, and effect paradigm to summarize the problems identified in the reports. This approach disclosed an underlying functional alignment related to welfare program structure. This alignment became the theme linking the administrative problems to the paradigm. Finally, once the structure was identified. we were able to develop legislative questions that might be useful to the Congress in deliberating over proposed welfare reform legislation.

We will present the results of using this analytical model on reports issued to the Congress.

9:15 LATE ARCHAIC PENTAGONAL KNIVES IN OHIO. Daniel C. Fox, 7603 Wahl Rd., Vickery, Ohio 43464 and Jonathan E. Bowen, 419 Sandusky Ave. Fremont, Ohio 43420.

Both Converse and Hothem have previously described pentagonal knives from the Late Archaic (3000-1000 B.C.) of Ohio. Examination of lithic biface collections from throughout the state shows variation in the selection of raw materials. The Miami drainage of southwestern Ohio yields specimens of Cedarville-Guelph chert, while Delaware chert predominates in the north-central portion of the state. Most pentagonal knives in east-central Ohio were manufactured from Vanport or Upper Mercer materials. Many specimens from the lake plain and till plain of north-central Ohio have been recovered from what appear to be upland hunting camps. The specimens which appear to have been most extensively re-sharpened during their use-life appear to be those of Vanport flint from the unglaciated plateau of east-central Ohio.

9:30 PERCEPTION OF CHILD SEXUAL ABUSE: VICTIM-PERPETRATOR RELATIONSHIP, VICTIM AGE, AND SEXUAL ACT. Julie Butcher, MaryLou Kalmar, Heather Martyne, and Mamatha Shetty, Box 385, Beall Hall, Kent, Ohio 44243.

This paper addresses the relationship between the relationship of the perpetrator and the victim, the specific sexual act, and the age of the victim, and the definition of sexual abuse. These variables were manipulated in an experimental vignette design. The sample consisted of 215 college students at two state universities. Findings specify that the definition of sexual abuse is dependent upon whether (1) the perpetrator is the father's girlfriend or the child's mother; (2) the act is "fondling" or "display"; and (3) the child is 6-years old or 13-years old. The analysis also explores the respondant's reasons for making the determination of sexual abuse and their style of searching for information to confirm their judgements.

9:45 AN INVESTIGATION OF CHARACTERISTICS OF NEWLY-EMPLOYED DEVELOPMENT OFFICERS. Diana Cook 60 Koehler St. Doylestown OH 44230

This study was designed to determine what knowledge, skills, and values chief development officers consider in the selection of entry-level development officers. Further, the study compared the factors deemed important in the selection of recently hired development officers with an effectiveness rating scale based on actual performance on the job.

The individuals surveyed in this study were chief development officers from public and private institutions that are members of the Council for Advancement and Support of Education (CASE). The Sample included small, medium, and large institutions.

The following research questions were developed to guide this study:
1. What knowledge, skills, and values do entry-level development officers possess?
2. Do the knowledge, skills and values of entry-level development officers differ on the basis of sex?
3. How well do knowledge, skills, and values of entry-level development officers predict their effectiveness on the job as rated by chief development officers?
4. Is there a significant relationship between age and years of experience of chief development officers and size and type of institution in predicting their ranking of knowledge, skills and values items?

10:00 A QUALITATIVE AND QUANTITATIVE ANALYSIS OF FISH REMAINS FROM THE WILLIAMS ARCHAEOLOGICAL SITE ON THE MAUMEE RIVER, PERRYSBURG, OHIO. Ted M. Cavender, Museum of Zoology, Ohio State University, Columbus, Ohio 43210 and Jonathan Bowen, 403 Sandusky Ave., Fremont, Ohio 43420.

The study site (33WO7 Feature 15) is located opposite the first rapids encountered on the lower Maumee River and has been carbon dated at 1360 A.D.. The specimens analyzed came from a garbage pit excavated by D. M. Stothers and field crew during the late 1970's. A 9 liter volume of fish skeletal remains taken from the pit consisted of 183 individuals belonging to 15 species. Suckers of 7 species dominated (61%) with Walleye (23%) and White bass (6%) forming the other major representatives. The most abundant species was shorthead redhorse (84 individuals). The smallest individual was a hogsucker (150 mm S.L.) and the largest was a walleye close to 700 mm S.L.. The majority of the walleye ranged in size between 270 mm and 460 mm S.L.. Other species identified were: mooneye, northern pike, silver redhorse, river redhorse, golden redhorse, greater redhorse, white sucker, channel catfish, brown bullhead, freshwater drum and smallmouth bass. Time of capture was early spring based on the numerous suckers and walleyes along with the associated remains of a deer fetus and a bear cub.

10:15 FORMAL AND INFORMAL HEALTH CARE SERVICES: COMPLEMENTARY SYSTEMS MODEL. Jeffrey Kleist, Department of Sociology, University of Akron, Akron, Ohio, 44325.

The aim of this study was to examine the actual relationship between a formal and informal system of health care. The belief that the relationship between professionals and non-professionals is one characterized by conflict/tension is not supported by this analysis. In fact, the opposite appears to be the case. Professionals in alcohol rehabilitation facilities and the mutual-aid group Alcoholics Anonymous appear to work successfully together, in lieu of their different orientations, to complement each other's available resources and thus provide a comprehensive system of health care for individuals suffering from the disease of alcoholism. A model has been proposed which characterizes the relationship between these two caregivers. In general, the complementary systems model outlined in this study can facilitate the development of service linkages in other areas of formal and informal health care where either no relationship exists or exists but is characterized by conflict and cross-purposes.

10:45 THE HOPEWELL CONNECTION: THE MIDDLE WOODLAND TIME PERIOD IN THE MAUMEE RIVER DRAINAGE BASIN OF NORTHWESTERN OHIO. David M. Stothers, Ph.D., Director, The Western Lake Erie Archaeological Research Program, University of Toledo, Toledo, Ohio 43606.

The presence of a Middle Woodland (ca. 1-500 A.D.) Hopewellian population in the Maumee River drainage basin of NW Ohio has been documented. Archaeological data sets derived from site survey, collection documentation, and site excavation have disclosed at least twenty-one site locations which attest to occupation by these Middle Woodland populations. Diagnostics supporting such a conclusion include: bladelets, bladelet cores, and Snyders Points fashioned of Flint Ridge chalcedony, as well as some diagnostic ceramics; small habitation sites which may include various types of specialized processing camps; and small circular burial mounds occuring in isolation or as groups. The various settlement types suggest a settlement system model similar to the seasonal Coalescence-Dispersal model which seems to characterize earlier Late Archaic and Early Woodland populations in the same region. Diagnostic ceramics, representative of these populations, although limited, suggest a western derived Havana Hopewell (possibly Goodall Focus) cultural affiliation, rather than a southern derived Scioto Hopewell affiliation.

SECTION I. ANTHROPOLOGY AND SOCIOLOGY
Afternoon Session - Room 2084 Founders Hall
Saturday, April 30, 1988
Jonathan E. Bowen, Presiding

1:30 SECTION BUSINESS MEETING

2:00 THE WESTERN BASIN LATE WOODLAND COMPONENT AT BIRCHARD LIBRARY (33SA172), FREMONT, SANDUSKY COUNTY, OHIO. Jonathan E. Bowen, 419 Sandusky Ave., Fremont, Ohio 43420.

Birchard Library (33SA172) is located on a sandy bluff overlooking the lower rapids of the Sandusky River. Western Basin Late Woodland, Fort Meigs Upper Mississippian, and 19th century Euroamerican archaeological features were encountered, and scattered Early Archaic, Early Woodland, and Wolf Late Woodland materials were found. The Western Basin Late Woodland component yielded several shallow hearths, the postmold outlines of two ca. 4X5 m subrectangular structures, and six human burials. Burial 1, a seven year old child, yielded a radiocarbon date of A.D. 1120±110 (Beta-23613), with a stable carbon isotope value of -19.0. Burial 2, a female in her late thirties who was overlain by Burial 1, was radiocarbon dated to A.D. 1370±70 (Beta-23336), with a stable carbon isotope value of -17.5. Although the radiocarbon dates are in reverse stratigraphic order, the burial vessel associated with Burial 2 suggests that it actually dates from the same period as Burial 1, or slightly earlier (ca. A.D. 900-1100). The stable carbon isotope values suggest that although these individuals consumed some corn, it was not a major dietary component. An adult male from the Durnwald site (33SA187), located across the Sandusky River, was radiocarbon dated to A.D. 1300±90 (Beta-23029), with a stable carbon value of -20.2, suggesting little corn in the diet.

2:15 FIELD PROBLEMS IN APPLIED SOCIOLOGICAL RESEARCH. Deb Miller, Dept. of Sociology and Anthropology, Kent State University, Kent, Ohio 44242.

The problem for this analysis is the differing expectations for research and research outcomes in the client organization. Specifically, a case study of a federal prison is presented in which there were two high level executives who differed in their interpretations of what the warden expected. The analysis utilizes a wide variety of sociological formulations to understand the organization and interorganizational factors which impinge upon the applied research progress. The ethical implications for the sociological researcher are discussed.

2:30 CHILD ABUSE: THE CONSEQUENCES OF ORGANIZATIONAL PARAMETERS AND SOCIAL TYPING. Karen Tolley. Dept. of Sociology, Kent State University, Kent Ohio 44242-0001.

Child abuse is once again a visible media focus. Interest in the issue of child abuse is periodically peaked by an incident of severe abuse or death. One aspect of these reports is the role played by formal human service organizations. The typical scenario is of a family with a history of agency involvement. There are questions posed by media and community as to the reasons the abuse or death occurred given agency involvement: if there was adequate agency intervention, why wasn't danger perceived? This study examines the role of the child welfare agency in the identification and subsequent processing and disposition of cases of actual or suspected child abuse. This includes the legal parameters within which these agencies must operate, the affects of budgetary constraints on case identification and subsequent service delivery, as well as the role of social typing on the part of all individuals concerned, beginning with the reference source and extending to all professionals within and without the agency involved in a given case. It will be shown that while agencies do provide service to families, they do so within organizational constraints and the effects of social typing on the part of workers and supervisors. There are a number of factors which affect the service provided and the outcome of a given case - factors which are not always consistent.

2:45 INCIPIENT FORT ANCIENT AT THE COUNTY HOME SITE (33SC17), SCIOTO COUNTY, OHIO. Patrick Riley, 1029 Ruhlman Ave., Portsmouth, Ohio 45662 and Jonathan E. Bowen, 419 Sandusky Ave., Fremont, Ohio 43420.

The County Home site (33SC17) is located at the base of Raven Rock near the mouth of Careys Run Hollow, overlooking the confluence of the Scioto and Ohio rivers. Maple Creek-like Late Archaic, Newtown/Watson-like Late Woodland, incipient Fort Ancient, Feurt Fort Ancient, and 19th century Euroamerican components are present. The incipient Fort Ancient component consists of two pit features, each about 1.5 m in diameter and 1.5 m deep. Each contained faunal remains (deer, elk, and turkey), floral remains (hickory and walnut shell fragments), and ceramics (mostly limestone-tempered with a minority of shell-tempered). A radiocarbon date of A.D. 1030±60 (Beta-23030) was obtained from the southernmost pit (Feature 18), in association with a limestone-tempered rimsherd which bears oblique incised lines and a teat-like lug. Although about 300 flakes and six preforms of river-cobble flint were found, no diagnostic bifaces were recovered.

3:00 THE HOSPICE PRIMARY CAREGIVER: A STUDY IN STATUS PASSAGE. Clint Snyder, Dept. of Sociology and Anthropology, Kent State University, Kent, Ohio 44242.

Barney Glaser and Anselm Strauss were the originators of the theoretical framework "Status Passage". It is this framework that will be used to examine the primary caregiver within the hospice program. The primary caregiver is a person, normally a family member, who agrees to coordinate the care of the terminally ill person from his inception into the hospice program until death. The research utilized qualitative, open-ended interviews to investigate the effect of the caregiving experience upon the caregiver. Attitudes toward the caregiving role, adjustments of the caregiver, and the projections after the completion of caregiving are among the ideas discussed.

3:15 COMFORT WITH WIFE-AUTONOMY IN BLUE-COLLAR AND WHITE-COLLAR MARRIED MEN. Wendy J. Strickland, Dept. of Sociology, Kent State University, Kent, Ohio 44242.

This study examines the similarities and differences between blue-collar and white-collar married men's comfort with four aspects of wife-autonomy--distinct social identity, independent means, expression of personal opinions, and physical separation. While blue-collar workers reported comfort with separation for employment, white-collar workers reported comfort with distinct social identity and expression of personal opinions. Comfort with independent means was found to be related to self-esteem, as measured by Coopersmith's "Self-Esteem Inventory", and comfort with separation for recreation was found to be related to the number of school-age children.

3:30 THE WRIGHT SITE: LOCATION OF A WOLF PHASE HOUSE STRUCTURE, ca. A.D. 1300-1400. Susan K. Bechtel, Laboratories of Ethnoarchaeology, The University of Toledo, Toledo, Ohio 43606.

Recently conducted analyses of ceramic and lithic artifacts have facilitated a preliminary interpretation of the Wright site (33WO128). Situated in Wood County near the village of Rossford, Ohio, the Wright site appears to be the location of a unique Wolf phase house structure built approximately A.D. 1300-1400. Additional data collected from the Wright site have also provided significant new insights into the settlement and subsistence system of incipient Mississippian Wolf phase populations in northwestern Ohio.

3:45 HOUSING AND ALIENATION. Thadd Coreno, 1706 E. Main S-10, Kent, Ohio 44240.

This paper proposes an explanation of the effect of the physical environment on alienation. More specifically, the physical environment discussed in the paper is low-income housing. Walter Buckley's systems theory is used to depict how the environment as input "gets into" the person. Lighted physical structures circumscribe personal and communal power from developing as well as preventing integration with the environment. Architectural correctives are recommended based on Oscar Newman's idea of defensible space. His suggestions concern creating zones of territorial influence that are easily surveyed. These changes would promote community. The most significant aspect of the proposed changes is the reduction of ambiguity in the environment while concomitantly structuring precise and clear boundaries where meaningful information can be encoded.

4:00 AN ANALYSIS OF ASIAN INDIAN PREFERENCES IN TELEVISION PROGRAMMING IN THE UNITED STATES. Geeta Venugopal, Department of Sociology, The University of Akron, Akron, Ohio 44325.

This paper is an exploratory type study which attempts to analyze generation differences between Asian Indians settled in the United States, a manifestation of which lies in their preferences for certain types of television programming, both American and Asian Indian. In order to understand these differences a study of the cultural ethos of Asian Indians was believed necessary. This paper presents a review of the process of assimilation. Furthermore it includes an analysis of the reasons for these differential preferences, between generations of Asian Indians. The relevance of this analysis to theories of assimilation is also discussed.

4:15 SACRED AND SECULAR INFLUENCES ON ADOLESCENTS' ATTITUDES AND BELIEFS REGARDING CIGARETTE SMOKING. James Quane, Department of Sociology, University of Akron, Akron, Ohio 44325.

Research has shown that the tobacco use patterns of most individuals are established during their adolescent years. Understanding of factors affecting adolescents' attitudes and beliefs about tobacco use therefore is very important to any attempt to influence their feelings about smoking. While the influence of parents and peers has been widely studied, other sources of influence have been investigated only moderately. This paper reports on the relative strength of the effects which school and religion have on the smoking attitudes and beliefs of seventh and tenth grade adolescents.

SECTION J. NATURAL RESOURCES
Morning Session - Room 110 Hopewell Hall
Saturday, April 30, 1988
Rosanne W. Fortner, Presiding

9:00 BALD EAGLE (HALIAEETUS LEUCOCEPHALUS) MANAGEMENT IN OHIO. Denis S. Case, Ohio Department of Natural Resources, Division of Wildlife, Fountain Square C-4, Columbus, Ohio 43224.

The bald eagle nesting population in Ohio declined from 15 pairs in 1959 to a low of only 4 pairs in 1975 and 1979. Production was lowest in the early 1970s, with no eaglets being produced in 1971 or 1972. The causes of the decline included chemical contamination of the eggs, mortality due to collisions with power lines, shootings, nest blowdowns, and highway accidents, and nest failure due to human disturbance. A number of management techniques were employed to protect and enhance the nesting population, including fostering of captive-bred young into wild nests, and nest site improvement. The biological response has been encouraging. The number of nesting pairs increased to 11 during the 1987 breeding season. Productivity rates were adequate for an increasing population in most years since 1979, with fostering accounting for 20% of the total production. In 1987, nine natural young fledged from six successful nests, and both of these figures are the highest since record keeping began in 1959. Total number of eagles seen during an annual midwinter survey has increased from 6 in 1979 to 18 in 1987.

9:15 RECLAIMED LAND USED FOR BREEDING PARK

J. Osborn Fuller
3928 Fairlington Dr.
Columbus, Ohio 43220

The International Center for the Preservation of Wild Animals is one new effort centered on creating a breeding park for animals. However it speaks to the total objective of conserving the environment. The prime objective is to reduce the rising rate of extinction which is now up to one species every year. All species possible must be preserved. If the cow becomes extinct as it once did in North America, what animals could replace it? What forms may be important in controlling disease as did molds as a source of penicillen. This year the African green clawed frog was found to have a new antibody which killed many bacteria, fungi and parasites. The antibody has been isolated, produced synthetically and now is being tested. The complex interrelated web of life of is being attacked with pesticides and herbicides. How many species can be eliminated before it collapses? Extinction is forever. The Center's objective is to develop a breeding park on a gift of 9,154 acres of stripped and re-claimed coal-

mined land. We plan to attract the public and educate them on the importance of preserving all life forms both plant and animal. We want to demonstrate how with planning a natural resource (coal) can be extracted, the land reclaimed and put to an important use if, industry, government and education work cooperatively.

9:45 ETHICS IN WILDLIFE FILMMAKING. Rosanne W. Fortner. School of Natural Resources, The Ohio State University, 2021 Coffey Road, Columbus, Ohio 43210.

In 1985 the Canadian Broadcasting Corporation produced a documentary entitled "The Cruel Camera," in which it exposed the techniques used by wildlife filmmakers to achieve spectacular, entertaining or rare photographs of animals in action. Instances of animal abuse and audience deception were documented. Using the examples given in the documentary, a questionnaire was developed to determine the extent to which individual wildlife filmmakers were willing to accept harm or deception as necessary components of their craft. Thirty filmmakers, mostly European, responded. On questions of animal abuse, the mean score was 2.15 out of 5.0, an indication that harm was generally unacceptable. For audience deception the mean score was 2.21, indicating that deceit was also unacceptable. An audience sample reviewed the same filmmaking scenarios and rated the animal abuse items at 2.37, slightly higher than the filmmakers' acceptability scale. On matters of deception, the audience was more accepting than the filmmakers, especially of deception resulting in entertainment.

10:00 BIRDS IN THE OHIO RIVER BASIN: A POSSIBLE INDICATOR OF ENVIRONMENTAL QUALITY. David Todt, Shawnee State University, Portsmouth, OH 45662

The Boatload of Knowledge provided a unique opportunity to census the birds along the Ohio River from Pittsburgh to Louisville during the summer of 1987. While some difficulties were experienced during the censusing along the River, the overall results, field work plus a literature and information search, do point to differences in bird species diversity along the Ohio River.

An overview of the Boatload of Knowledge and the possibility of using bird species information as an indicator of environmental quality in the Ohio River Basin is discussed.

10:15 GUIDEBOOK TO THE GEOLOGY AND ARCHAEOLOGY OF SELECTED STATE PARKS AND HISTORIC SITES OF OHIO. NEAL, Lynn, A., Department of Geology, The College of Wooster, Wooster, OH 44691.

There are 129 Ohio state parks and historic sites maintained by the Ohio Department of Natural Resources and the Ohio Historical Society. Very few of these areas have been investigated in detail, and the published material is adequate and limited for most.

The locations included in this study are Flint Ridge State Memorial (Licking Co.), Hocking Hills State Park Region (Hocking Co.), Kelleys Island State Park/Glacial Grooves State Memorial (Erie Co.), Mohican State Park and State Forest (Ashland Co.), Nelson Kennedy Ledges State Park (Portage Co.), and Serpent Mound State Memorial (Adams Co.). These areas were chosen because of their popularity, accessibility and/or availability of literature.

This guidebook was undertaken to provide published information on these areas as possible field trip localities. This guidebook should prove valuable to both public and professional readers, including teachers, students, weekend hikers, and vacationers interested in the geology and archaeology of Ohio.

10:30 EX POST AND COUNTERFACTUAL ANALYSES USING A COMPUTER-BASED NATURAL RESOURCES INFORMATION SYSTEM. Dr. Robert L. Vertrees. School of Natural Resources, The Ohio State University, 2021 Coffey Road, Columbus, OH 43210.

The Ohio Capability Analysis Program (OCAP), operated by the Ohio Department of Natural Resources since 1973, is Ohio's most comprehensive computer-based natural resources information system (CNRIS), a type of geographic information system (GIS). The author has used OCAP since 1980 to provide ex post and counterfactual analyses of land-use impacts of three Ohio programs that reduce property taxes on farm land or forest land. The case-study area for this ongoing longitudinal research is a rapidly developing suburban area in Medina County. The author has also classified all uses of OCAP and described the political and financial uses of such classifications. This paper distinguishes between ex post, counterfactual, and other types of longitudinal analyses or studies, identifies specific aspects of OCAP and other GIS's that must be kept in mind when conducting "after-the-fact" or "counter-to-the-facts" analyses, and reports methods and results of the Medina County case study. Reasons are offered why OCAP and other CNRIS have been used less for resource policy analysis than for resource planning and other uses. Recommendations are given regarding further use and development of OCAP in general and regarding further use of OCAP and other CNRIS in ex post and counterfactual analyses of public policies that affect resource use and environmental quality.

SECTION J. NATURAL RESOURCES
Afternoon Session - Room 110 Hopewell Hall
Saturday, April 30, 1988
Robert E. Roth, Presiding

1:30 SECTION BUSINESS MEETING

2:00 THE INTEGRATION OF A LOW COST DIGITAL GIS WITH A NONPOINT SOURCE WATER POLLUTION MODEL TO EVALUATE ALTERNATIVE LAND MANAGEMENT STRATEGIES Professor John W. Simpson, Department of Landscape Architecture, The Ohio State University, 190 W. 17th Ave., Columbus, Ohio, 43210.

A low cost digital geographic information system (GIS) has been integrated with a nonpoint source pollution model in order to evaluate the water quality consequences of alternative land management practices. The Big Darby Creek watershed, in central Ohio, serves as the case study. Data in the GIS includes detailed soil classifications, topographic slope, and landcover derived from thematic mapper satellite data. The Agricultural Nonpoint Source Pollution Model (AGNPS) has been adapted for use with the GIS. AGNPS, utilizing land management information for the watershed obtained from interviews with local farmers, and data from the GIS, calculates resulting sediment loads, nitrogen and phosphorus concentrations, and chemical oxygen demand within the river. Consequently, the GIS/AGNPS system enables alternative land management practices throughout the watershed to be quickly evaluated on the basis of their resulting water quality impacts. Initial results indicate the relative water quality benefits obtained from various changes in agricultural practices when applied to specific areas or uniformly throughout the watershed. Results also illustrate the practicality of such a planning technique for widespread use in Ohio.

2:30 A MODEL FOR ENVIRONMENTAL MANAGEMENT EDUCATION: A DEVELOPING COUNTRY APPLICATION. Robert E. Roth, Ph.D. School of Natural Resources, The Ohio State University, 2021 Coffey Road, Columbus, Ohio 43210.

A model for Environmental Management Education was effectively developed, implemented and evaluated in the Dominican Republic across both a cultural and a language barrier. The model was one of sixteen components of a comprehensive problem oriented, interdisciplinary Natural Resources Management Project (NARMA) which focused on conservation problems in a severely eroded major food producing watershed. Targeted workshops for small hillside farmers (campesinos), community leaders, agricultural technicians, teachers, and school students were employed. A baseline of beliefs and attitudes of the target populations in relation to environmental issues was also established.

2:45 THE ATTITUDES AND BEHAVIORS OF ASBESTOS ABATEMENT WORKERS TOWARD ENVIRONMENTAL SAFETY. Cary Litherland, 451 Stanley Ave., Columbus, OH 43206.

The purpose of this study was to determine the types and amounts of training received by asbestos workers, worker attitudes toward environmental safety, relationships between attitudes and behaviors, and relationships between attitudes and worker characteristics. The study concluded that asbestos workers received training in varying amounts from their employer, other asbestos workers, manuals, the safety inspector, and training courses. Mean attitudes of the workers indicated the importance of safety practices, and the need for more information on this topic. Attitudes seemed to be related to 75% of the worker behaviors. Attitudes were related to the worker characteristic of level of education.

3:00 PRIORITY OF AND CONSTRAINTS ON TEACHING AQUATIC TOPICS IN OHIO SCHOOLS. Marcia L. Seager, Research Associate, The Ohio Sea Grant Education Program 059 Ramseyer Hall, The Ohio State University, Columbus, OH 43210.

The Great Lakes are an important freshwater resource. With the growing threats to worldwide supplies of fresh water comes a need for increased knowledge about and awareness of this resource.

This survey of 5th and 9th grade teachers in Ohio assesses their self-determined level of knowledge about selected freshwater and marine topics, the importance teachers personally assign to those topics, and the extent to which those topics are already present in the curriculum.

It was hypothesized that Ohio teachers will profess to know more about marine than freshwater topics and that they will give highest priority for teaching to those topics about which they know most. Preliminary results have shown that although Ohio teachers indeed know more about marine topics, nevertheless they give a high priority for teaching to certain high-visibility freshwater topics such as hazardous materials in the Great Lakes.

It is hoped that the results of this study will provide a rationale for developing freshwater aquatic topics for elementary and middle school curricula and for promoting teacher education about freshwater topics.

3:15 RAIN OF CONFUSION: A HISTORICAL REVIEW OF ACID RAIN LEGISLATION AND SCIENCE; Charles V. Runyon, Robert E. Hathaway, and Robert E. Williams; Ohio Edison Co., 13th Floor, 76 S. Main St., Akron, Ohio 44308

"Acid Rain" is not a new phenomenon; the term was first coined in 1872 by Angus Smith. However, it has only been since the 1972 United Nations Conference on the Human Environment held in Stockholm that acid rain has become one of the most controversial and heavily debated environmental issues.

This paper traces the history of the issue, examining in parallel its legislative and scientific background. We will examine the major scientific issues and the preeminent research programs investigating the issue, in particular, the National Acid Precipitation Assessment Program (NAPAP). At the same time we will look at the political climate, particularly in Congress, where we will survey the most important legislative initiatives and their progress before either the House or the Senate.

We will also look at our own experience with precipitation chemistry and discuss briefly the absence of significant acidity in it.

We contend that the progress of the science has had little impact on the political momentum of acid rain and that the two have become divergent over time. While the science unmistakably indicates the absence of an environmental crisis, the rhetoric and action in Congress often take on an apocalyptic tone.

3:45 ACID DEPOSITION EDUCATION IN U.S. MAN AND BIOSPHERE RESERVES. Kim Palmer, Rosanne Fortner and Gary Mullins, 2021 Coffey Road, School of Natural Resources, The Ohio State University, Columbus, Ohio 43210.

The U.S. National Park Service (NPS) administers a number of parks as internationally significant Man and Biosphere areas. These and other ecological preserves are threatened by acid deposition and degraded air quality. Boundaries cannot stop the intrusions. Legal restraints help the problem but do not eliminate the impact. The National Park Service is now turning to interpretive education to address the issue. For the next five years visitors to NPS areas will be encouraged through education to help solve the problem. This national and international effort holds promise for a complex scientific and political issue.

SECTION K. GENETICS AND CELL BIOLOGY
Morning Session - Room 2120 Founders Hall
Saturday, April 30, 1988
Robert H. Essman, Presiding

9:00 ISOELECTRIC FOCUSING AS A TECHNIQUE OF GENETIC ANALYSIS OF BLOOD PROTEINS IN AN ISOLATED POPULATION OF WHITE-TAILED DEER. Michele S. Lynch and Bonnie L. Lamvermeyer, Department of Biology, Denison University, Granville, Ohio 43023.

Isoelectric focusing is a sensitive analytical procedure in which electrophoresis occurs within a pH gradient established by amphoteric molecules termed ampholytes. Slight charge differences between proteins differing by 0.001 pH units are distinguishable. Hence, this technique has been employed to detect genetic polymorphisms of blood proteins in an isolated population of white-tailed deer, Odocoileus virginianus, on the National Aeronautics and Space Administration's 5400 acre Plum Brook facility near Sandusky, Ohio. Two general protein staining procedures were employed, namely Coomassie Brilliant Blue R-250 and Vesterberg's stain. Different means of iron saturation for transferrin differentiation were used including ferrous ammonium sulfate and hydroquinone. Transferrin staining employed either Ferene S or 2,4-Dinitroso-1,3-naphthalenediol. A tetramethylbenzidine procedure was used to visualize hemoglobin polymorphisms. The enzymes superoxide dismutase and esterase D were monitored by the production of zymograms. Prefocusing for 500 volt-hours was advantageous during a three hour run employing a total of 2700 volt-hours with the power set constant at 22 watts. Elimination of carbon dioxide as a pH gradient distorter was accomplished by conducting the electrophoretic run in a nitrogen environment.

9:15 CLUES TO THE FUNCTION OF THE WOUND EPITHELIUM DURING LIMB REGENERATION: MONOCLONAL ANTIBODIES AS INVESTIGATIVE TOOLS. B. L. Tomlinson, D. J. Goldhamer, and R. A. Tassava Departments of Zoology and Molecular Genetics. The Ohio State University, Columbus, 43210

Monoclonal antibody WE3 reacts to the wound epithelium of the adult newt limb regenerate and to a variety of cells in other tissues. Because reactive cells appear to be involved in ion transport and/or secretion, the presence of the WE3 antigen suggests a similar function for the wound epithelium. This is supported by the fact that carbonic anhydrase (CA), an enzyme that is involved in bicarbonate ion exchange and the maintenance of pH homeostasis, is found in cell types that also express the WE3 antigen. Differential centrifugation showed that both CA and WE3 activity are enriched in mitochondrial and membrane/particulate fractions. Gel filtration showed the molecular weight of the WE3 antigen exceeds 200,000 daltons and this fraction also contained CA activity. It is not clear whether WE3 reacts to a single molecular species or one component of a larger aggregate. These data suggest the hypothesis that mAb WE3 recognizes a membrane-bound isozyme of CA. Supported by NIH Grant HD 22024.

9:30 TABULAR CALCULATIONS OF FREQUENCIES OF ALLELES IN MULTIPLE ALLELIC SERIES IN POPULATIONS AT EQUILIBRIUM. Francis E. Nussbaum, Jr., Kent State University, Tuscarawas Campus, New Philadelphia, Ohio 44663.

Algebraic calculations demonstrate that if in a population of diploid organisms where a series of multiple alleles have reached phenotypic equilibrium and the dominance hierarchy is known, then the frequencies of each of the respective alleles in the series may be calculated by finding the difference between two square roots representing two summed expressions of frequencies of certain phenotypic classes observed in the population. The minuend is the square root of the summation of the frequency of the phenotypic class in the population which displays the allele under consideration and the frequencies of all other classes which express alleles of lesser dominance. The subtrahend is the square root of the summation of the frequencies of all phenotypic classes in the population expressing alleles of lesser dominance than the allele under consideration. By using the formula, $f(\text{allele}) = \sqrt{\Sigma f(n)} - \sqrt{\Sigma f(n-1)}$, a pocket calculator, and a tabular format, the frequencies of four or more multiple alleles in a multiple allelic series in a population at equilibrium may easily be determined.

9:45 CYTOGENETIC ANALYSIS OF AN IRRADIATED AND UNIRRADIATED M4D CELL LINE ESTABLISHED FROM A METASTATIC LUNG NODULE: T.M. Norvell and R.J. Jamasbi Bowling Green State University, Department of Biological Sciences, Bowling Green, Ohio 43403.

The metastatic M4D nodule was isolated from the lung of a BALB/c mouse after im inoculation of DEN_3 forestomach carcinoma cells into the thigh. The cell line established from this nodule (M4D 0r) differed from

other metastatic nodules in many biological characteristics including sensitivity to X-irradiation. The majority of the metastatic lines did not survive greater than 250 rads. Some of the M4D populations were able to survive 1000 rads. The irradiated line (M4D 1000r) tolerated an additional exposure of 1000 rads after 4 in vitro passages (M4D 1000 & 1000r). Radioresistance in heterogenous tumor cell systems is a major concern in cancer radiotherapy. Presently, the mechanism of this radioresistance is unknown. To look at the chromosomal makeup of these subpopulations, one hundred cells from each line were cytogenetically analyzed. Differences in both the chromosome number and centromere position occurred with radiation treatment. All cell lines had mean chromosome numbers greater than normal. Analysis of the centromere position showed deviation from a normal position. The presence of acrocentrics, metacentrics, submetacentrics, and fragments were analyzed. Differences were observed after radiation exposure.

10:00 A CYTOGENETIC STUDY OF TWO HOMOSEQUENTIAL SPECIES OF HAWAIIAN DROSOPHILA: D. GYMNOBASIS AND D. SILVARENTIS. Jae H. Lee and Jong S. Yoon. Dept. of Biological Sciences, Bowling Green State University, Bowling Green OH 43403

The two species of Hawaiian Drosophila were examined by means of a study of metaphase karyotypes, polytene chromosomes, and hybridizations. They showed noticeable cytogenetic differences in spite of the fact that they had been considered "homosequential" species. First, D. silvarentis differed from D. gymnobasis by a deletion of some bands of polytene chromosome 6. Secondly, the metaphase plate of D. gymnobasis showed two pairs of double-length rods, whereas that of D. silvarentis had one pair of double-length rods and one pair of slightly elongated rods. In addition, all the polytene chromosome arms of the two species exhibited variations in puffing patterns and the location of constriction sites except for microchromosomes. The results of the laboratory hybridization tests indicated that there was a partial nature of reproductive barriers between the two species. It could be concluded that the two species are not "homosequential" species, at least in the strains examined in this study.

10:15 LONGEVITY OF 80 SPECIES OF DROSOPHILA. J.S. Yoon, K.P. Gagen and D.L. Zhu. Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Adult longevity of Drosophila is dependent upon many factors. In this study the differences in longevity due to species, strain, sex, and mating status were examined for 80 species (126 strains) belonging to the D. obscura, melanogaster, willistoni, and virilis species groups. Both inter- and intra-specific differences in adult longevity were observed. These include differences due to sex and mating status. In most species studied, females lived longer than males. In general, the longevity of unmated females exceeded that of mated ones while the longevity of mated males was greater than that of unmated ones.

10:45 SECTION BUSINESS MEETING

SECTION K. GENETICS AND CELL BIOLOGY
Poster Session - Adena Gym
Saturday, April 30, 1988

Board H @ 10:00 a.m. 51E-52A, A REGION RICH IN MATERNAL-EFFECT GENES IN DROSOPHILA. K.Z. Doll and E.M. Underwood, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

The study of maternal effect mutations in Drosophila melanogaster yields valuable information regarding the amount of maternal influence in processes specific to early development. Two cloned sequences which exhibit a maternal transcription pattern have been isolated. These have been localized to the right arm of the second chromosome at 51E-52A, a region rich in maternal-effect genes. In the initial stage of a saturation screen, four female sterile (FS) maternal effect lethals, one embryonic lethal and a pupal lethal mutation have been isolated. PA77, one of the female sterile mutations, is a polyphasic hemizygous lethal with death occurring at the embryonic, larval and pupal stages. As a homozygote PA77 effects eggshell formation in the female. FS8 adult females produce eggs which undergo DNA replication without accompanying nuclear divisions at the fourth/fifth division cycle. Abnormal chromatin clumping is observed in the FS mutant PL63. Two alleles of an embryonic lethal effecting head and posterior development have been isolated, L6/L16. The phenotypes of the various mutations are described as are the phenotypes of the various deficiency chromosomes used in the mutation analysis.

Board I @ 10:00 a.m. WOUND EPITHELIUM OF REGENERATING NEWT LIMBS TURNS ON WE3, AN INTRACELLULAR ANTIGEN.
R. A. Tassava, D. J. Goldhamer, B. L. Tomlinson and N. Akhtar Departments of Molecular Genetics and Zoology, Ohio State University, Columbus, 43210

Monoclonal antibody (mAb) WE3 recognizes an intracellular antigen of integumentary glands which is not present in skin epidermis. Wound epithelium of regenerating limbs becomes WE3+ beginning at 2 weeks after amputation and remains reactive thereafter. Other mAbs and graft recombinants were used to test if (1) WE3+ wound epithelium originates from glands or if (2) WE3 negative skin epidermis migrates over the wound surface and then "turns on" WE3. The results favor the latter view but do not rule out a glandular contribution. mAbs 4S and 217 do not react to glands or do so minimally yet both strongly react to skin epidermis and to all wound epithelium (at all stages of regeneration), suggesting that 4S+ and 217+ skin epidermal cells become 4S+ and 217+ wound epithelial cells, which then turn on WE3. We combined early WE3- wound epithelium with blastema mesenchyme from later regenerates (when the wound epithelium is WE3+). The WE3- wound epithelium became WE3+ after association with the mesenchyme. Finally, we have observed what appears to be a step wise "turn on" of the WE3 antigen. The antigen at first is weakly reactive and appears granular, then becomes strongly reactive and appears fibrous. (supported by NIH Grant HD 22024).

SECTION L. MATH AND COMPUTER SCIENCE
Morning Session - Room 2091 Founders Hall
Saturday, April 30, 1988
Glenn Lipely, Presiding

9:00 SOME INCONSISTENCIES IN DIFFERENT FORTRAN COMPILERS. F.Abdollahzadeh and M. Badii. The University of Toledo, Computer Science and Engineering Department, 2801 W. Bancroft, Toledo, Ohio 43606 and Pace University, Computer Science Department, New York, New York.

Despite a long established body of relevant computer science, lack of precise specification of certain aspects of FORTRAN and deviation from the published standards, permit the construction of non standard programs which run under different systems to give contradictory results.

For many years, routines with names such as SNOOP, SNEAKY, and THUNK have appeared in high-level language programs and have been used to cause/investigate side-effects. Current work in programming language development is moving towards the outlawing of side-effects, but it is not the job of an implementor to legislate against bad programming style and, if a program is legal, his system must obey it.

The single, but important FORTRAN feature that has been studied indicates, first that the language definitions are not adequate and, secondly, that some implementations do not follow those aspects of the standards, that are properly defined.

Although comparative documentation does exist, it does not include sufficient semantic detail to resolve the insecurities mentioned therein; i.e. does not include the Do-Loop.

9:15 HIGH SCHOOL MATHEMATICS ENROLLMENT OF HISPANIC STUDENTS. Dr. Joy S. Lindbeck, Department of Secondary Education, The University of Akron, Akron, Ohio 44325.

Variables associated with the completion of mathematics courses by Hispanic secondary students were investigated with the High School and Beyond data tapes of 1980 and 1982. The sample was 1614 in 1980 and 402 in 1982. Multiple linear regression with Cohen's power analysis, backward regression, and correlation statistical procedures were used to analyze seventy-one variables in 1980 and seventy variables in 1982.

Stable predictors of the scheduling of mathematics courses included the number of English courses, the number of science courses, mother's expectation and

variables related to mathematics.

These findings suggest the importance of scheduling mathematics courses with appropriate home and school counseling.

9:45 ANALYSIS AND DESIGN OF A FAULT-TOLERANT LOOP ARCHITECTURE. K.Y. Srinivasan. The University of Toledo, Computer Science and Engineering Department, 2801 W. Bancroft St. Toledo, Ohio 43606

In this paper we address the general issues of fault-tolerance in loop architectures. One general approach for increasing the fault-tolerance of a system (with respect to a given measure of fault-tolerance) is to incorporate some redundancy in the system. Based on this approach, we formulate the following fault-tolerant system design problems:

1) Given a 0-fault tolerant structure (with respect to some measure of fault-tolerance) generate a k-fault-tolerant structure under the constraint that the amount of redundancy used be minimal.

2) Given a k-fault-tolerant structure (with respect to some measure of fault-tolerance) maximize k with the available system resources.

Problem 1 addresses the issues of providing optimal redundancy in the system for a given increase in fault-tolerance, while problem 2 deals with optimally reorganizing the system resources.

In this paper we present the analysis and design of a class of loop architectures that belong to the set of circulants of the form $C_N<1,h>$. Interestingly, loop architectures of the form $C_N<1,h>$ permit solution to problem 2 for a number of measures of fault-tolerance.

10:15 THE WORM IN NEWTON'S APPLE. Robert Weinstock, Dept. of Physics, Oberlin College, Oberlin, OH 44074

When Newton's Principia was published in 1687 it was enthusiastically applauded for its inclusion of a mathematical proof that a body moving under the sole influence of an inverse-square central force must pursue a conic-section orbit. Although the proposition is true and the belief that one finds the first proof of it in the Principia has generally persisted for three hundred years, there has appeared in the present decade a demonstration -- accessible even to nonmathematicians and nonphysicists -- that the Principia's purported proof embodies a fallacy. (American Journal of Physics, July 1982, pp. 610-617.) A new, even simpler, formulation of this demonstration is offered in the present paper, along with a discussion of some of its implications, including the assignment of credit to Newton's long-time antagonist, Robert Hooke. The well documented significant contribution of the latter to Newton's understanding of central-force orbital motion is here outlined.

SECTION L. MATH AND COMPUTER SCIENCE
Afternoon Session - Room 2091 Founders Hall
Saturday, April 30, 1988
Glenn Lipely, Presiding

1:30 SECTION BUSINESS MEETING

SECTION M. PSYCHOLOGY
Morning Session - Room 2008 Founders Hall
Saturday, April 30, 1988
Robert Gandee, Presiding

9:00 A SYMPTOM PROFILE ANALYSIS OF EDUCATED, ADULT WOMEN USING THE SCL-90-R. Rita Cowan, Isadore Newman, Helen K. Cleminshaw, 13267 Cinnamon Lane, Mogadore, Ohio 44260.

In today's society more women are involved in multi-role situations. Research is finding that this reality is often a source of increased stress and symptomatology. The counselor today needs special assessment tools to help identify and treat the complex problems of these women. The SCL-90-R is a commercially published instrument, Derogatis (1975), that is a multidimensional self-report symptom inventory reflecting indices of distress. It is hypothesized that:

1. Married, working women with children will demonstrate a symptom profile characterized by hostility and anxiety over married working women without children.
2. Widowed women will show a symptom profile characterized by increased depression and somatization compared to married women.
3. Single women will demonstrate a profile characterized by more interpersonality sensitivity than married women.

The sample consisted of greater than 1,000 educated female respondents selected from the national membership list of the American Association of University Women.

9:15 EATING ATTITUDES IN PRACTICING PHYSICIANS. FRANCO, Kathleen N., TAMBURRINO, Marijo B., HERMES, Julia C., CARROLL, Brendan T. MCO Dept. of Psychiatry, C.S. #10008, Toledo, OH 43699.

The rising rates of anorexia and bulimia, together with the stress on those health professionals diagnosing these illnesses, are brought together in this study.

Eating attitudes of 202 physicians, aged 29 to 85, were surveyed using a demographic questionnaire and the Eating Attitudes Test-26. Six physicians (2.9%) scored in the abnormal range. Significant associations were found between age (43-48 years, 53-60 years, and 60 years), preoccupation with thinness, and bulimic behavior. Those who reported themselves to have had a weight problem in preadolescent or adolescent years were also more likely to have increased scores. Retired physicians and those over age 60 demonstrated increased oral control. Female gender or participation in aerobics or bodybuilding were also significantly correlated with higher scores. Several subspecialties (obstetrics/gynecology, general internal medicine, pathology/radiology) were associated with elevated mean scores and preoccupation with thinness. 44.6% of the physicians underestimated their "ideal" weight. The authors hypothesize about the vulnerabilities of physicians to eating disorders and societal influence on their ability to recognize and diagnose these illnesses.

9:30 ISOKINETIC STRENGTH COMPARISONS OF THE KNEE FLEXORS AND EXTENSORS ACROSS AGE AND SELECTED SPORTS. Mark Peracchio, Robert Gandee and Bruce Hollering. Department of Health and Physical Education, The University of Akron, Akron, Ohio 44325.

Peak Torque (PT), angle of peak torque (APT) and peak torque per kilogram of body weight (PTK) of the knee were compared across age and sport in high school, collegiate, and senior (over age 55) male athletes from the sports of football, soccer, basketball, and the Ohio Senior Olympics. The Cybex II Isokinetic Dynamometer was used to determine PT, APT, and PTK relationships at the rotational velocities of 60 deg./sec., 180 deg./sec., and 240 deg./sec. Subjects performed five maximal right and left knee extensions and flexions at each rotational velocity. Comparisons were made using the greatest value obtained and its corresponding torque angle. Analysis of variance was used to determine statistical significance. Thirty-four (34) and 36 specific tests showed significant difference among groups. These data suggest that differences exist in PT, APT, and PTK of the knee flexors and extensors across age and sport. College athletes demonstrated greater PT, followed by the high school athletes and the senior olympians. Soccer and basketball players dominated football players in PT of both quadriceps and hamstring muscle groups.

9:45 INVESTIGATION OF PERSONALITY VARIABLES THAT DIFFERENTIATE BETWEEN THOSE WHO ATTEND SEMINARY SCHOOL FOR PASTORAL TRAINING WITH A NON-COUNSELING EMPHASIS VERSUS THOSE WITH A COUNSELING EMPHASIS: IMPLICATIONS FOR THE EDUCATION AND TRAINING OF RELIGIOUS PERSONNEL. Jeffrey M. Robson, Richard Dobbins, Becky McMorrow, Isadore Newman. 1300 Kennedy Blvd. #110 Cuyahoga Falls, Ohio 44221.

The subjects are graduate students entering seminary school to become pastors and preachers or religious counselors. The subjects come from large counseling and education centers in the mid-west. Both sources are affiliated with each other. The number of subjects is 250. The average age of the subjects is 30. Each subject has been administered the MMPI and the CPI. Discriminative analysis will be conducted in which the criterion variable is group membership. The predictor variables will be the MMPI and the CPI. The purpose of the study is to determine: How well does the MMPI and the CPI differentiate between the two groups? Does the MMPI account for a significant amount of variance in discriminating between groups over and above

what can be accounted for by the CPI? Does the CPI account for a significant amount of variance in discriminating between groups over/above what can be accounted for by MMPI? Additional analysis will be done.

10:00 WORK EXPERIENCE IN ADOLESCENCE: HELP OR HINDRANCE? Daniel J. Flannery, 242 Townshend Hall, 1885 Neil Avenue, Columbus, Ohio 43210.

Common sense dictates that work experience in adolescence enhances such qualities as responsibility and self-concept. Reality dictates, however, that the jobs adolescents typically hold are boring, repetitive, unstructured, and unrelated to career goals. Hence, the psychological effects of many part-time, summer and government sponsored work experiences on adolescents have been more negative than positive. A theoretical and empirical examination of cooperative education, a more structured, well-supervised and career-related work experience, provides some valuable insight into an effective work program that may benefit the individual adolescent.

The sample for this study consisted of 101 undergraduates (72 males and 29 females) in the College of Engineering at Ohio State University. Workers (N=53) completed self-report measures of psychosocial maturity (PSM) and self-esteem before and after a three month co-op work assignment. The control group (N=48) consisted of non-workers with no previous career-related work experience. A 2 X 5 X 2 mixed design ANOVA was employed to analyze the data. Independent variables included student status (work vs. non-work), number of previous co-op work experiences (zero to five) and test (pre vs. post). Results revealed that after their first work experience, many students lower their work specific but not global self evaluations. First time workers also tended to rate themselves as less open to change and less socially adequate. Students with more than one work experience, however, had much higher self evaluations of work specific self-esteem and PSM.

10:30 A REEXAMINATION OF ADOLESCENT EGOCENTRISM: HOW DO WE HANDLE KIDS IN THE CLASSROOM? Daniel J. Flannery, 242 Townshend Hall, 1885 Neil Avenue, Columbus, Ohio 43210.

The concept of egocentrism is central to the Piagetian notion of ontogenetic intellectual development. Defined as a lack of differentiation between the self and the physical or social environment, egocentrism takes on a special meaning in adolescence when the individual acquires the cognitive ability to think on a conceptual level. The resulting capacity to take into account other people's thought is the crux of adolescent egocentrism, characterized by the emergence of the imaginary audience (IA) and personal fable (PF) constructs. The IA is the belief that others are as preoccupied with the adolescent's behavior and appearance as she is about herself. The PF involves the individual's sense of personal uniqueness and indestructibility.

Recent research has examined the egocentrism construct and its relation to cognitive development. Results do not support the putative relationship between formal operations and egocentrism and even suggest a negative correlation between the two concepts. This evidence points to the need for a reformulation of the egocentrism construct in adolescence. One particularly robust framework which may explain the emergence and diminution of of adolescent egocentrism is Selman's levels of perspective-taking ability (Lapsley & Murphy, 1985). This framework is employed to suggest ways the educator may reduce egocentrism in the classroom. Techniques include role playing, enhancing perspective-taking in discussion, and modeling effective communication skills to reduce ambiguity in social interactions.

SECTION M. PSYCHOLOGY
Afternoon Session - Room 2008 Founders Hall
Saturday, April 30, 1988
Mary J. MacCracken, Presiding

1:30 SECTION BUSINESS MEETING

2:00 THE TEACHING/LEARNING PROCESS: STATE OF THE SCIENCE CIRCA 1987. Ralph F. Darr, Room 301, Zook Hall, The University of Akron, Akron, Ohio, 44325.

This paper, an update of an earlier paper, The Teaching/Learning Process: State of the Science Circa 1986, will look at the effect that the "back to basics" movement, emphasis upon management by objectives, and the call for merit pay for teachers has had on the teaching/learning process. Focus will be upon how these rather straight forward approaches to resolving educational issues have really affected the complex teaching/learning process. Among the complex variables discussed will be: (1) teacher characteristics, (2) student characteristics, and (3) instructional and organizational characteristics of classrooms. Teacher characteristics will be primarily reviewed from the perspective of student evaluations of instructors and demographic data. Student characteristics will be discussed in terms of (1) personal characteristics, (2) past academic performances, and (3) learning styles. The instructional/organizational section will consider these instructional modes: (1) lecutre, (2) teacher managed programs, and (3) cognitive styles. Suggestion for future integrative research will be offered.

2:30 A Time Lag Assessment of the Effects of Social Facilitation Upon 12-Year-Old Boys and Girls. M.J.MacCracken, The University of Akron, R.E. Stadulis, Kent State University, K. Hughes, The Ohio State University.

Previous investigation of developmental effects of social facilitation (MacCracken, Stadulis, & colleagues, 1984, 1985 1986, 1987)has suggested spectator and coaction situations affect children differently dependent upon age, sex and type of task. Spectator effects can be either incremental or decremental. On the other hand, coaction seems to enhance performance generally during the elementary school years. These previous findings have indicated that at age 8, girls were facilitated positively by coactors, while boys evidence best performance before spectators. The purpose of this present study was to attempt to determine if the variables affecting social facilitation continue to demonstrate their effect for 12-year-olds. Boys (n=45) and girls (n=44) were assessed on their dynamic balance performance using narrow (4.5 cm) balance beams. These 12-year-olds represent three different groups tested two years apart. Dependent variables were the distance to the first step-off and total number of step-offs.Tasks were classified for each child as easier or more difficult. For easier tasks, no social facilitation effects were evidenced. On more difficult tasks (first trial) performance was positively facilitated by spectators. For trial two boys performed poorer under coaction and spectator but girls did best in coaction.Greater effects were noted for girls perhaps due to type of task,balance beam walking.

SECTION M. PSYCHOLOGY
Poster Session - Adena Gym
Saturday, April 30, 1988

Board A @ 2:00 p.m. EXPECTED AFFECT INTENSITY IN TWO AGE GROUPS. Sara Staats and Gay Atha, The Ohio State University: Newark Campus. Newark, Ohio. 43055.

Expected negative affect and expected positive affect were measured in college students and in non-college middle-aged persons (N = 323). Intensity of both negative and positive affect decreased in the middle-aged sample. However the decrease in negative affect was greater than the decrease in positive affect. Most of the individual negative items distinguished between students and the older adults. Further, within the middle-aged group, negative affect correlated negatively with age while the correlation of positive affect and age was not significant. While cohort differences can not be ruled out, the results suggest a picture of middle-aged affect that is in contrast to the stereotype of increasing pessimism and neuroticism with increasing age. Based on a consideration of individual item content, improved coping with interpersonal hassles is suggested as one interpretation of the decrease in negative affect with increasing age.

Board B @ 2:00 p.m. HELP-SEEKING, DISCOMFORT, AND HOPE IN SOCIAL SERVICE RECIPIENTS. Sara Staats and Dixie Merrill, The Ohio State University: Newark Campus, Newark, OH 43055.

Why do persons seek help from social service agencies and what are their expectations for future positive outcomes in their lives? These questions were addressed through a survey and an in-depth interview of 25 persons who were recipients of social services. The sample was categorized in terms of age and as to whether or not they were victims of battering. While Van Dyke (1962) found that high discomfort was associated with accepting treatment, we found that reasons for seeking help differed for the two age groups. Younger persons (mostly battered women) sought help because of discomfort while older persons sought help because of hope rather than discomfort ($X^2 = 6.33$, $p < .05$). Interview questions resulted in more significant differences between age groups than did survey questions. The young and old groups did not dif-

fer on several survey measures of hope, depression, control, or perceived health. Younger persons did perceive more possible positive changes in their lives. This information suggests how social service agencies might tailor information to different age groups in order to maximize motivation for help-seeking.

Board C @ 2:00 p.m. SOCIAL LABELING, MEMORY, AND JUDGMENT. John J. Skowronski and Jean Isham, The Ohio State University, Newark Campus, Newark, OH, 43055.

This study investigated how social labels affect memory and judgment. One group of subjects was given a story that repeatedly provided a social label. A second group of subjects was given the same story, but no label. Additionally, some subjects were told to memorize the facts from the story, while other subjects were told to form an impression of the main character (John K.). Two days later subjects were given a quiz. Three types of items were used: True items, story-contradictory items, and story-unrelated items. The items varied in their consistency with the mentally retarded stereotype (consistent, inconsistent, irrelevant). Subjects were asked to indicate how confident they were that an item was or was not presented in the story. Subjects also rated the degree to which John K. was consistent with their mentally retarded stereotype. Results revealed that social labels had no effect on subjects' decisions about information that was true or that was story-contradictory. Only items that were story-unrelated were affected by the labeling manipulation. Subjects who knew John K. was retarded were more likely to erroneously recall that a retarded-consistent item was from the story than those subjects who were unaware of the retardation; subjects who knew John K. was retarded were less likely to erroneously recall that a retarded-inconsistent item was from the story than those who were not given the label. The instructional set manipulation had no effect on recognition accuracy, and no response time differences were obtained on these items. However, although their perceived goodness of fit did not differ, subjects who had been exposed to both the set and label manipulations were able to answer the "fit" question faster than subjects in the other conditions.

Board D @ 2:00 p.m. SAFE BODY COMPOSITION LEVELS IN MALE BODY BUILDERS. C. Earnest, B. Hollering, R. Gandee, D. Shaw. University of Akron, Akron, OH 44325

With today's widespread interest in physical fitness, many individuals are turning to body building as a means of developing aesthetic muscular appeal. However, weight and fat loss techniques involved in this activity often involve unsafe practices that may lead to health risks. In the sport of body building, there should be a concern for the lack of professional supervision as related to the method and amount of body weight and fat lost. In this study, thirteen male amateur body builders were evaluated for body composition changes five weeks prior to competition, one day before competition, and ten days after competition, through the use of RJL Systems bioelectric impedance analyzer. Subjects were measured for changes in total body weight (TBW), relative body fat (RBF), absolute body fat (ABF), and lean body weight (LBW). Results indicated a 42% reduction in RBF levels between five weeks before competition and the day before competition ($\bar{X}$ RBF = 8.4% and 4.8% respectively). These results were significant ($p < .0005$ as determined by a one-way ANOVA with an alpha level of .05. LBW values for same time period reveal an increase ($\bar{X}$ LBW = 80.3 kg and 81.7 kg). Although this secondary data was not significant, it does indicate that the competitors were able to reduce RBF while maintaining LBW. However, it is recommended that these athlete's adopt the 5% minimum RBF level without medical supervision as set forth by the American College of Sports Medicine for wrestlers.

SECTION N. JUNIOR ACADEMY
First Morning Session - Room 118 Hopewell Hall
Saturday, April 30, 1988
Karen L. Schwenk, Presiding

9:15 DO DIETS AFFECT MICE (MUS MUSCULUS)?
Joyce Wu
384 Merrick Dr. Beavercreek, Ohio 45385

My project is a comparison between the nutritional effects of a solid diet versus a liquid diet. Three Mus musculus, from the same litter, about one month old, were used in each group. The Mus musculus were weighed on a Triple Beam Balance scale every other day. They were measured on a regular ruler. My problem was: "Do Diets Affect Mus musculus?". My hypothesis was that the liquid diet would effect the tooth growth of a Mus musculus and its growth rate. Both groups were fed Purina Mouse Chow. The first part of my hypothesis was unable to be proven because of factors I had not known of. The liquid diet Mus musculus were fed a liquidy substance which they had to pick up with their paws. The food would later then become smeared on the walls where it solidified. By natural instinct, the Mus musculus would gnaw it off, therefore wearing down their teeth. I did prove the second part of my hypothesis however. The solid diet Mus musculus gained weight because when they ate, they ate at a higher concentration, while expending less energy to do so. Meanwhile, the liquid diet Mus musculus had to expend more energy to eat food at a lesser concentration. When I averaged the weight gains of each group, I found that the liquid diet Mus musculus had gained 16% body weight from the beginning of the experiment to the end while the solid diet Mus musculus gained 32%.

9:30 FROM WIND TUNNEL TO AIRPLANE
Rodney D. Hartman
1305 Coonpath Rd. N. W., Lancaster, Oh. 43130

The project's purpose was to construct a flying model ultralight aircraft, using data collected from the testing of airfoils, fuselages, landing gear, wing tips and wing configurations. The airfoils, fuselages, and wing tips were designed, constructed, and tested in a wind tunnel. The wind tunnel, with an 8'' by 11'' test section, was designed and constructed for the project. The airfoils were tested for lift and drag, and the fuselages were tested for drag. The wing tips were observed for turbulence and vortexing, as visible gasses passed by them. The landing gear, which have to be light, small, and strong, were tested during simulated landing tests. Different wing configurations were designed and tested utilizing a gymnasium for flight testing the models. The data collected from the tests of the different parts was used in designing a radio-controlled ultralight model.

9:45 THE ANALYSIS OF PRIMARY AND SECONDARY TUMORS OF THE BREAST BY MEANS OF MONOCLONAL ANTIBODIES. Shelly Jackson, Benjamin Logan High School, 2568 Sandusky St., Box 98, Zanesfield, Ohio 43360.

This study deals with a monoclonal antibody B72.3, which is specific for the antigen TAG-72. Prepared slides were stained using the avidin biotin immunoperoxidase staining procedure. The purpose of these studies was to determine whether or not there was heterogeneity between the primary tumors and their metastases, and between the metastases themselves. It was concluded that there was TAG expression on breast carcinomas that was not expressed on normal breast tissue or benign proliferates. There was a small amount of heterogeneity between the primary tumors and their metastases and between the metastases themselves.

10:15 DETERMINATION OF THE STABILITY CONSTANT OF CHROMIUM(III) THIOCYANATE COMPLEX. Lara J. Snedeker and Gordon A. Parker. Chemistry Department, University of Toledo, Toledo, OH 43606-3390

Thiocyanate ion forms a series of weak complexes with numerous metal ions. Chromium(III) thiocyanate complexation has been previously reported but with divergent results. Application of a thiocyanate ion-selective electrode for potentiometric determination of the chromium(III) thiocyanate formation constants is new and is used here along with careful attention to experimental details to reassess these values.

10:30 HOW STUDENTS PERCEIVE AIDS, Carrie Stemen, 296 Charleston Ave., Columbus, Ohio, 43214

This paper reports how knowledgeable a selected group, 518 seventh and eighth grade students, are on the topic of AIDS. Information was collected from a review of current research and a questionnaire submitted to the target group.

Seventh and eighth grade students had a basic understanding of AIDS. However, adolescents were found to be uncertain as to what type of infection AIDS is and many do not know the basic symptoms. Most seventh and eighth grade students had not communicated with an adult about AIDS and would not object to a student with AIDS attending class with them. There was an indication that students were not aware that AIDS is not transmitted through casual contact. Results of the questionnaire revealed students have a basic understanding of AIDS, and their information usually did not come from their parents or from another adult.

Research data pointed to four basic recommendations necessary to the improved understanding of AIDS by middle school students. While in school, they should be provided with information to reduce this risk of contracting AIDS. Public service announcements on television listing symtoms

would help promote an awareness with the general population. School and church meetings to bring parents and children together to learn about AIDS would fulfill a need for wider distribution of information. Sensitivity meetings in schools to help prepare students and parents in case an AIDS infected student enrolls.

10:45 THE EXTRACTION OF GROWTH FACTORS FROM OSSEOUS TISSUE Christine Brown Benjamin Logan High School, Box 98, Co. Rd. 5, Zanesfield, Ohio 43360

Epidermal growth factor is given its name because it causes a thickness in epidermis by increasing keratinization. Epidermal growth factor was first isolated from male mice submandibular gland. Fresh sliced bovine femur was frozen with liquid nitrogen and crushed. The crushed bone was then rinsed with ethanol and then again with diethyl ether. Growth factors were then extracted using 0.02M Tris pH 7.5 and EDTA, the extract was then dialized The liquid after dialysis was frozen and lypholized. A solution of the extract was prepared and protein levels determined. Electrophoresis was performed to determine molecular weight of the proteins. The extract was then used in a DNA synthesis assay to determine growth stimulation. The amount of protein from the 20 ml. dialysate was 0.49 mg. The polycrylamide gel electrophoresis results indicated the presence of proteins of molecular weights 16,000-7,000 Daltons. These proteins were most likely growth factors. The results of the DNA synthesis assay show growth stimulation. Results prove there was a growth factor present.

SECTION N. JUNIOR ACADEMY
Second Morning Session - Room 116 Hopewell Hall
Saturday, April 30, 1988
David M. Weaner, Presiding

9:15 VARIETY DIFFERENTIATION OF SOYBEANS BY SOUTHERN BLOTTING. J.P. Rinehart, 370 W. Main St., Waldo, Ohio 43356

The differentiation of crop varieties is an essential requirement for the seed certification industry. In the past, variety differentiation of soybeans has been performed rather subjectively by evaluating plant phenotypes. By using southern blotting techniques, differentiation can be made more exact and reliable. For this technique to work, however, research must be conducted to find significant genetic differences in various soybean varieties.

Several common production-type soybean varieties were chosen for differentiation. In my proposed procedure, the first step is the isolation of plant DNA. Isolated DNA is then digested by the restriction endonucleases Bam HI, Eco RI, and Hind III. The resulting fragments are separated by size, using electrophoresis, and are then transferred from the electrophoresis gel to nitrocellulose filters. Nucleic acid reannealing techniques are used to detect the fragments on the filters which are homologous to the DNA probe being used. The probe is a segment of DNA radioactively labelled with ^{32}P, that codes for a specific protein, such as glycinin, beta-conglycinin, or lectin, which is common to all soybean plants. Autoradiography of the filter shows a distinct pattern, which may differ from variety to variety. An assessment and comparison of these patterns may be used to differentiate the varieties.

9:30 ACID RAIN "THE EFFECTS OF SO_2 AND NO_x ON THE BIOSPHERE"
Tray Hill
Rt 2
McArthur, Ohio 45651

Abstract: Ecology is the study of all living things and how they interact with the nonliving environment. It encompasses biology, zoology, chemistry, and more. Because of the growing evidence that humans are inadvertently destroying the natural environment and perhaps themselves with it, there is a need for immediate attention by scientists. All life on earth exists within the biosphere. There are two major parts of the biosphere; the physical being inorganic, or nonliving, and the biological being organic including all life forms.
This experiment is about the effects of acid rain on our biosphere. Two aquariums were set up to represent the plant and animal life. One tank was for the control while the other one had sulfur dixoide emitted by burning sulfur and paraffin. Acidic deposition was formed by the simulated acid precipitation as I introduced the sulfur dixiode. The pH levels, the plant and animal life were observed for adverse as well as subtle changes taken place.

9:45 THE EFFECT OF AMMONIUM CHLORIDE CONCENTRATION ON THE OUTPUT OF THE LECLANCHE CELL. Eric Benedict. 3317 Stoneway Dr E, Sandusky, OH 44870.

LeClanche cells or carbon-zinc dry cells are primary chemical power sources. There are four main components of a LeClanche cell: the zinc anode, the manganese dioxide cathode, the electrolyte and the separator. The electrolyte is a solution of zinc chloride and ammonium chloride. The effect of the ammonium chloride concentration on the cell voltage and energy output was studied. The testing method used was modeled after the industrial Immediate Open-Circuit Voltage (IOCV) test and utilized a custom-designed testing apparatus. The testing apparatus alternately connected the cells under test to a resistive load and then to a high impedance measuring circuit. This cycle was repeated for the duration of the test. The measuring circuit digitized the voltage of the cells immediately after the resistive load was removed and sent this digitized number to a computer for analysis. The measuring circuitry consisted of three cascaded LM3914 Bar/Dot Display Drivers, a diode matrix, and seven NAND gates. The cell voltages and the total energy outputs were directly affected by the concentration of the ammonium chloride. The highest energy output was found at saturation of ammonium chloride. Fractional reductions of ammonium chloride resulted in fractional decreases in cell energy output.

10:15 THE EFFECTS OF ULTRAVIOLET RADIATION ON CHROMOSOMES OF THE HUMAN LYMPHOCYTE. Suzanne Connolly, 8129 TWP Rd. 150, West Liberty, Ohio 43357.

Chromosomes are string-like structural units of nucleus that carry the hereditary determinants known as genes. Chromosomes are composed of double-helix DNA, RNA, histones, and structural proteins.

This experiment was conducted to determine the effects of ultraviolet radiation on chromosomes of the human lymphocyte. The cells were cultured in 199 and 1640 medium and exposed to ultraviolet light for varying time periods.

The ultraviolet light did cause chromosomal aberrations. The following types of aberrations occurred: chromatid breaks, monosomy X, chromosome fragments, and centromere breaking.

10:30 GRAPHOLOGY-THE SCIENCE OF DETERMINING A PERSONALITY THROUGH HANDWRITING
Michael Lofgren 819 22nd N.W. Canton,O 44709

The main objective of this research project was to find the validity of graphology, or whether determining someone's personality through handwriting is possible. After reading, research, and performing experiments this researcher proposed the following hypothesis: There is a definite correlation between an individuals' personality traits and their handwriting characteristics.

The paper contains five main points of graphology and expands from there. First, it deals with slant. Slant most often shows how a person will emotionally respond. Secondly pressure in handwriting is discussed. Pressure reveals energy and stress levels. Spacing is mentioned next. Spacing will tell the extravagance or frugality of a writer Signatures as representative of people's self-perceptions are also discussed. Lastly, the formation of all letters contributes to analyzing handwriting.

The experiments performed required some analyses by the experimenter. Participants were asked to give a sample of their handwriting, but were not informed of the purpose. The samples were analyzed and compared to a form filled out by the participants about their self perceptance. The information supported the hypotheses that personality and handwriting directly correspond to one another.

10:45 EFFECTS OF GLYCERINE CONCENTRATION ON THE RATE AT WHICH THE LIQUID DRAINS FROM A SOAP BUBBLE Alicia Alonzo, 2727 Coventry Road, Columbus, Ohio 43221

The colors of a soap bubble are caused by the refraction of light between the two membranes of its outer wall; therefore, changes in the thickness, or space between the

membranes, cause changes in the color of the bubble. By comparing the color changes to changes in time, it is possible to determine the rate at which gravity works against surface tension to pull the liquid at the top of the bubble down towards the bottom, decreasing the thickness until the bubble pops.

The purpose of this project was to determine the effects of glycerine concentration on the rate at which the liquid drains from a soap bubble.

A metronome and audio tape recorder were used to record the colors of the bubbles, blown from six solutions containing different amounts of glycerine, for each second of their life spans. The colors were ordered according to intensity in order to remove imprecise data. Each color observation was assigned a thickness value which was graphed in terms of time to show the rate of liquid drainage. These rates were plotted in terms of glycerine concentration.

The data showed that as glycerine concentration increases, the rate of liquid drainage decreases. In order to confirm this trend, further research must be conducted, controlling temperature, humidity, and bubble size.

SECTION N. JUNIOR ACADEMY
First Afternoon Session - Room 118 Hopewell Hall
Saturday, April 30, 1988
Karen L. Schwenk, Presiding

1:30 SECTION BUSINESS MEETING

2:15 CARBOHYDRATE UTILIZATION IN SOYBEAN REPRODUCTION Melissa Beuerlein, 469 Willow Lane, Mt. Gilead, Ohio 43338

Plant physiologists have estimated that enough sunlight energy is available in Ohio to produce soybean yields of over 200 bu./ac. The current average yield is about 40 bu./ac. Using intensive management, researchers at Ohio State University have produced yields of 105 bu./ac. Low soybean yields are due to the abortion of over 70% of the flowers. If flower abortion was ended and all flowers produced the normal number and size of seeds, the current 40 bushels per acre yields would increase to 133 bu./ac. This indicates that the basic reproductive system is capable of greater yields.

A study was designed and conducted to determine if the amount of carbohydrates produced per unit of leaf area would affect pod set and yields. Treatments included: 1) branch removal and two thirds of the leaf area, 2) branch removal and one third of the leaf area, 3) branch removal and 4) control.

The results indicate leaf area removal greatly reduced yield, mostly through fewer and smaller seed, but to a lesser extent than expected, due to adjustments in the length of the grain fill period. Branch removal allowed more of the available carbohydrates to be used for reproductive processes as indicated by a decrease in flower abortion. Therefore, there is a potential for increasing yields by increasing the amount of carbohydrates available to flowers which should result in an increased pod set.

2:30 NOW YOU SEE IT-NOW YOU DON'T! Maria Louisa Kalorides 3615 Fulton Dr., N.W. Canton, Ohio 44718

This project investigates whether or not a helium-neon(He-Ne)laser can be used to make a hologram. My hypothesis is that by using a single-beam reflection system, a hologram can be achieved with a He-Ne laser.

I used a He-Ne laser in a primitive darkroom, and chose to use a single-beam reflection system to make my hologram, because it was the best system to use **in order** to succeed under the primitive conditions of my experiment.

I discovered that it is possible to make a hologram and reconstruct the hologram's three-dimensional image by using a single-beam system and a He-Ne laser, under the primitive darkroom conditions, but only if specific variables are controlled.

3:00 SURVIVAL AND VIABILITY OF CHINESE HAMSTER OVARY CELLS FROZEN IN LIQUID NITROGEN BASED ON THE TIME FROZEN, CRYOPRESERVATIVE, AND THE CONCENTRATION OF THE CRYOPRESERVATIVE. Rolf. N. Barth. 2670 Crafton Park, Columbus, Ohio 43221.

The purpose of this research project was to determine the survival and viability of Chinese Hamster Ovary (CHO) cells after they had been frozen in liquid nitrogen. The effectiveness of the cryogenic agents dimethyl sulfoxide (DMSO) and glycerol in preserving CHO cells for a defined time interval and a defined concentration have been compared. Effectiveness of the cryopreservatives was measured by the percent of cells that survive, using a colony forming efficiency assay, and the percent of cells that are viable, using a trypan blue dye exclusion test. The experiment was run repeatedly to establish valid observable patterns. The method of freezing consists of exposing the vials, with 1 mL of the solution in them, to liquid nitrogen vapor for 20 minutes and then submerging them in the Dewar containing liquid nitrogen. The results from the experiment showed that the viability of the cells was inversely related to the period of time that they were frozen. Another pattern shown by the results is that a 5.0% concentration of DMSO seems to yield the highest viability at short and long time periods and the highest survival at short time periods. This research was carried out at The Ohio State University's Cell Culture Laboratory under the supervision of Dr. Ralph Stephens. (Supported in part by a grant from the Ohio Academy of Sciences.)

3:15 SMOKING...DO YOU GET A RISE OUT OF IT? Sheri Bunch 20100 Meranda Road Maplewood, Ohio 45340

High blood pressure occurs in more than 60 million Americans. Cigarette smokers have a 70% greater death rate due to hypertension and coronary heart disease than non-smokers.

In this experiment, I wanted to determine if quitting smoking would cause blood pressure to decrease. A 37 year old male was the subject. He smoked an average of 80 cigarettes each day. For two months, blood pressure readings were taken before and after a variety of activities performed as a daily routine. These activities included smoking, resting, lifting weights, and walking up and down a flight of stairs. I calculated the average blood pressure readings for each activity and also the average blood pressure overall. His average blood pressure was not high. However, I was positive it could be reduced.

During the next two months, he quit smoking. The same blood pressure reading procedure occurred, excluding those pertaining to smoking. I found that his blood pressure decreased in every activity after he quit smoking.

In conclusion, smoking cigarettes usually causes an increase in blood pressure. It causes blood vessels to constrict and loose their elasticity. It also causes a decrease in the amount of oxygen that can be acquired by the blood. These factors all account for hypertension. In this case, maybe being a "QUITTER" will save lives.

3:45 OPTIMAL CONDITIONS FOR MAXIMUM POTENTIAL GENETIC EXPRESSION AND FERTILITY FROM SOMATIC EMBRYOGENESIS OF GOSSYPIUM HIRSUTUM L. Wendy M. Yee 5127 Springfield Ct. Westerville, Ohio 43081

Cotton is one of the few species for which a "standard" for induced somatic embryogenesis has not developed. Previous methods have produced plants whose fertility rates fell well below what was required for further gene studies. Present work is based in part upon 1986 protocol developed by N. Trolinder & J. Goodin (Lubbock, TX - 1986). Major modifications have been made to substantially lower contamination levels. Fresh Coker 312 seed is surface sterilized and is germinated on Murashige-Skoog media without seed coat. Hypocotyl sections are removed no less than 5 days after seedling germination and placed on callus induction media, wound side up. Callus induction consists of: MS salts, B5 vitamins, Fe-EDTA, 30 g/l glucose, Gel-rite, 0.1 mg/l 2,4-D and 0.1 mg/l kinetin. Cultures are maintained under 30 degree Celsius conditions and are removed only when callus is formed 6-8 wks. later. Liquid suspension cultures are inoculated at 100mg callus tissue per 10ml liquid media. Media structured as before, minus gelling agents and growth regulators. Cultures are rotated at 120 rpm under same temperature as before at 80-100 umol/m^2/s, 16:8 hour photoperiod. Suspensions are sieved regularly to remove large tissue clumps. Passaging routine performed every 4-6wks, including resuspension. Resultant embryos are germinated in culture tubes of fine vermiculite saturated with Stewart & Hsu (1977) organogenesis media containing 0.1 mg/l IAA. Healthy plantlets with fully developed root systems and 3+ leaves are transferred to greenhouse conditions. Protocol modifications included the addition of beta-lactam antibiotics such as cefotaxime and carbenicillin to callus initiation media. Southern blots, Cat assays, and NptII assays are the suggested forms of transformation checks if transformation is involved.

4:00 CAN LOUD MUSIC HAVE AN EFFECT ON HUMAN HEARING AND THE HUMAN HEART ? Nikki Hall 13032 Airhill Rd. Brookville, Ohio 45309

The human ear contains tiny hair cells that turn sound waves into messages the brain can understand. These hair cells can be damaged or destroyed when we subject them to loud music with head phones or rock concerts. The critical level starts at 70 decibels and many concerts exceed 110 decibels. The effect of loud music resulting in constriction of the blood vessels ultimately contributes to an elevation of blood pressure. Stimulation of the accelerator nerves results in a quickened heartbeat. Loud music stimulates this nerve.

SECTION N. JUNIOR ACADEMY
Second Afternoon Session - Room 116 Hopewell Hall
Saturday, April 30, 1988
David M. Weaner, Presiding

2:15 *CIS*-TETRAMETHYLTETRALINYLIDENE FROM *TRANS*-TETRAMETHYLTETRALINYLIDENE.
Rebecca Roesner*,James E. Gano,
Department of Chemistry, University of Toledo, Toledo, Ohio 43606.

The *cis/trans* isomerization of tetramethyltetralinylidene was studied to advance recent research on the effects of steric congestion on the *cis/trans* isomerization of alkenes.

trans-Tetramethyltetralinylidene was obtained through a titanium coupling reaction and purified by crystallization. No photochemical changes were observed in *trans*-tetramethyltetralinylidene at room temperature, in the solid state (temperatures as low as 14 K), or when a triplet sensitizer was added. These results inferred that no isomerization took place.

Changes were observed in *trans*-tetramethyltetralinylidene when it was cooled to -30 °C in the liquid state, photolyzed, and analyzed by 90 MHz NMR. The new species, presumably the *cis* isomer, reverted back to the starting material when heated. Due to the level of uncertainty in the 90 MHz experiment and the arrival of a 400 MHz NMR at the University of Toledo, the experiment was repeated. Two samples of *trans*-tetramethyltetralinylidene were cooled to ~ -30 °C and spectra were taken. The spectra strongly supported the formation of the *cis* isomer. Results were especially interesting because the NMR spectra of the *cis* and *trans* isomers agreed with molecular mechanics calculations and an X-Ray crystal structure.

2:30 DANGER -- HAIR SPRAY, ROBIN MARIE KLUSCH, 721 SOUTH ROCKHILL, ALLIANCE, OHIO 44601

The use of hair spray among adolescent women is very common. This project is a multi-year effort to document the amount of usage, if it is used in a confined area, and the effect of hair spray inhalation on the lung tissue of laboratory rats. A survey of attitudes, product definition, usage patterns and brands used was conducted. Patterns were defined and an experiment designed to expose mature laboratory rats to the three most commonly used brands of spray. The lung tissue was then examined for gross and pathological changes. It was found that the rat exposed to hair spray had lung inflammation present after a 6 week exposure. One exposed lung examined had numerous visible changes and all exposed lung tissue had an increased amount of inflammation on pathological examination. This study is still in progress to determine if other body systems concentrate the components of the spray once it is inhaled.

3:00 ANOREXIA NERVOSA: THE DISTORTED MIRROR
Jeanne A. Vitka
4420 Millwater Drive
Powell, Ohio 43065

Anorexia Nervosa has become a growing problem among young women today. Since the "perfect body" has become so important in a society centered around food many young women feel compelled to starve themselves. Driven by the desire to be thin, too many girls have stepped over the fine line of dieting and are now starving themselves.

I developed a questionnaire to indicate how many girls in the central Ohio area had an anorexic attitude towards food. After researching the topic, I developed questions that had weighted responses. The weighted responses helped me to determine whether the respondent had an anorexic attitude, a weight-preoccupied attitude, a weight-concerned attitude or a non-weight concerned attitude.

I sent out 1,593 questionnaires to ten schools in different social and economic areas. I compared grade averages, age differences (11-18), and grade differences (6-12). Of those surveyed 3.3% showed anorexic attitudes toward food. Even though this percent does not sound dangerous, it is estimated that 60% of those displaying anorexic thoughts will become anorexic.

I have found out how serious this disease really is, killing over half of its victims. I would like to bring its dangers to the attention of Ohioans.

3:15 THE DESIGN OF A PRESSURE DIFFERENTIATED CLOUD CHAMBER FOR COSMIC RAY RESEARCH, INEXPENSIVE BUT SUFFICIENT
Brian S. Preston, 3875 Rio Grande Ave., Groveport, OH 43125

ABSTRACT: A cloud chamber was engineered to be inexpensive (under $75) and be able to detect Alpha, Beta, and Gamma radiation. The chamber was also engineered to have a low to medium level of complicacy and have a long life expectancy. The most efficient way to do this was to reduce the number of moving parts. This was accomplished by basing the cloud chamber on a pressure differentiated model rather than a volume differentiated model. To compensate for the slow de-pressurization of the pressure varied model was a separate pre-vacuumed cylinder. This would allow the gas to expand to a factor of 10 times it's original volume, thus decreasing the pressure. Another method that compensated for the slow depressurization of the pressure varied chamber of the cloud chamber was to increase the resolving time. This was done by increasing the concentration of Argon in the chamber to nearly 100%.

The temporary change for supersaturation of the particles were as follows: Positively charged particles at 300 K were -71.9; negatively charged particles at 300 K were -60; neutrally charged particles at 300 K were -60. The initial pressure for temperature change at a final pressure of 14.7 PSI were as follows: Positively charged particles were at 19.60 PSI; negatively charged particles were at 18.38 PSI; neutrally charged particles were at 18.38 PSI.

3:45 HOW DOES A CO_2 ATMOSPHERE AFFECT PROTOZOAN LIFE? Mark Wilson, 1087 Asbury Road, Cincinnati Ohio 45255

The experiment that I performed was designed to represent the effects of CO_2 pollution on a global scale by showing how it affects a microbial population. This was accomplished by setting up 2 cultures both containing a 50:50 ratio of Amoeba Proteus and Euglena. Then, by adding carbon dioxide to the variable culture, and using the other as a control, the experimental procedure was set up. These cultures were allowed to sit for 8 weeks and at the end of each week, the CO_2 was replaced in the variable culture. Both cultures were exposed to 9 hours of light each day, and the population was measured per milliliter of water for both organisms in each vial.
When the 8 weeks were over, the data was compounded into graphs, charts, and tables. The results showed that, in a carbon dioxide vial, the population of Euglena rose to 95:5 ratio and the Amoeba Proteus population died out to 5%, while the control showed no change. This data demonstrated that, in an atmosphere rich in carbon dioxide, photosynthetic organisms thrive, while hetertrophic organisms die out and the original niche of the Amoeba Proteus population is filled with additional Euglena. This shows that global pollution of carbon dioxide may cause photosynthetic organisms to grow at a very rapid rate and cause a severe imbalance in the biosphere. Not even the oxygen given off by these photosynthetic organisms could overcome a continual release of CO_2 into the atmosphere.

4:00 ISOLATION AND TREATMENT OF CHEYLETIELLA PARASITIVORAX FROM ENGLISH ANGORA RABBITS.
Michael Johnson, Perry High School, 3737 Harsh Ave, Massillon, Ohio 44646

The wool mite, Cheyletiella parasitivorax, is found as an ectoparasite on English Angora rabbits (Oryctolagus coniculus). There seems to be a relationship between the presence of this mite and increased matting of the long angora wool--which makes it commercially unusable. The presence of this mite was recognized in the late 1940's and early 50's, however research was not conducted. Competition from imported Chinese wool reduced commercial American production to zero.

The problems being addressed are more than that of matting wool, but also severe dandruff and skin flakes, as well as diminishing health and possible death. In vitro tests on isolated mites were conducted to determine the effects of several readily available commercial preparations

(carbaryls, pyrethrins and combinations of the two) on the mites. These preparations must eliminate the mites without jeopardizing the rabbit's health. The treatment must also be practical and easily applied.

SECTION N. JUNIOR ACADEMY
Poster Session - Adena Gym
Saturday, April 30, 1988

Board E
@ 2:00 p.m.

THE EFFECTS OF A NUCLEAR WINTER ON VEGETATION by J.Spencer Rezkalla, 241 S. East St., P.O. Box 343, New Holland, OH 43145

My project is on the effects of a mild nuclear winter simulation on bush bean plants. I used data from the most sophisticated computer simulation known as TTAPS. As the controls for my simulation, I grew a total of 12 plants (6 experimental group, 6 control group). The experimental bean plants were grown in an environment of low light and a temperature of approximately 5 C (40 F). The control bean plants were grown under normal conditions of 20 C (70 F) with normal lighting. The results showed that growth stopped in the experimental group shortly after the nuclear winter simulation began. The control group continued to grow normally. I kept a log and recorded growth and appearance every day for a five day run time. As shown by the results, I believe that a lack in light stopped the growth of the experimental plants because what little photosynthesis that occurred in the plants was primarily used for their respiration. I studied other nuclear winter scenarios also. I hope to research and experiment with this interesting topic.

Board F
@ 2:00 p.m.

SAFE IN SOUND - A STUDY OF MUSIC AND YOUR BLOOD PRESSURE by

Jamie Rittner
148 Linwood Dr.
Alliance, Ohio 44601

This study examines the effect of music and noise on the blood pressure of twenty five women between the ages of thirty and sixty. Participants in the study listened to classical music, rock music and noise with their blood pressure being recorded before and after each piece. In each case there was a change in blood pressure although the average change overall was very small. The conclusion reached was that music does affect blood pressure but in different ways for different people.

Board G
@ 2:00 p.m.

WHAT IS THE MOST EFFICIENT WAY TO ABSORB SOLAR ENERGY?
Amy Kneidel, 2041 Overcrest St., Alliance, OH 44601

I was interested in finding the most efficient way to absorb solar energy. I made an apparatus with twelve insulated chambers. Each chamber had different absorbing materials, covered with a well-sealed plate of glass. This produced the "greenhouse effect" often used in solar collectors. I aimed the chambers at the sun and measured each chamber temperature. Temperatures were measured by using thermocouple wires inserted in each chamber. On two chambers, I tested double panes to see the effect of heat loss from the glass. These chambers became ten to fifteen degrees hotter than with a single pane. I tested a four watt night light to try to get an idea of how much energy was being absorbed. Since the double pane black crumpled paper chamber got about twice as hot as the night light chamber, I concluded that about eight watts was absorbed. I tested the effect of clouds by experimenting on a sunny day, a partly cloudy day, and a cloudy day. The temperature rise of the best chamber was 142 degrees on the sunny day, 66 degrees on the partly cloudy day, and only 13 degrees on the cloudy day.

Board H
@ 2:00 p.m.

EFFECTS OF DIFFERENT NUTRIENTS ON SATIETY
Michelle Meeker
356 W. Johnson St.
Upper Sandusky, OH 43351

Satiety is a subject that is new and not well understood. Nobody quite knows where the satiety signals come from in order to tell a person that he is full. It is known, however, that satiety affects eating patterns greatly and that fats contain more satiety than do carbohydrates or proteins. In this project I tried to find out whether fat's high satiety level is due to caloric density or chemical composition. I did this by calculating a rat's daily caloric intake and then adding supplements of protein, fat, and sugar into their diets. I recorded how the supplements affected each rat's diet and possible weight loss or gain. As result of the experiment, fat was found to have a high satiety level because of its chemical composition. This is because the caloric intake in the rat that was fed fat decreased from the average caloric intake before the fat was added to his diet. If the caloric intake in the rat that was fed fat stayed the same, it would have proven that fat's satiety was due to its high caloric density.

Board I
@ 2:00 p.m.

THE GLASS MIRACLE. By Eric D. Landversicht.
Dept. of Chem. Upper Sandusky High School
602 N. Warpole Upper Sandusky OH. 43351

The Purpose of this project was to first define the atomic, chemical, physical, thermal, and electrical properties of glass. I then explored the history of common flat glass production. Following this I discussed the three major types of glass production: vertical drawing, rolled glass, and float glass production. Then with the assistance of Guardian Industries, I did indepth research on float glass production (annealed glass), tempered glass, laminated glass, and reflective glass. I then conducted three tests on the glasses: impact resistance using a prick punch, a scratch resistance using a key, a stone, and a piece of fine sand paper, and a safety test after the glass was broken. My hypothesis for these tests were: laminated glass was the most impact resistant, the reflective glass would scratch the easiest, and tempered was the safest after it was broken for a person to handle with minimal protection. In total this project took eight months of research and over 500 miles of travel to three Guardian Industries glass producing plants in Ohio, Michigan, and Indiana.

Board J
@ 2:00 p.m.

THE EFFECTS OF LIGHT AND FORCED FEEDING OF THE DIONAEU MUSCIPULA (VENUS' FLYTRAP)
Steve Solacoff
470 Shafer Dr.
Upper Sandusky, OH 43351

Upon obtaining eight newly budded Dionaeu muscipula (Venus' flytrap), equal amounts of food, distilled water, and sunshine were given to each. At the end of one month, all plants were of equal size.

Four plants were put in total darkness and four in light. Two plants in the light and two in the darkness were fed weekly by placing hamburger in the traps. The experiment was continued for sixteen weeks. The plants that were deprived of food and light turned mostly black, although some of the traps lost their color and became somewhat clear; they died after approximately seven weeks. The plants that were deprived of light, but were fed, died after approximately five weeks. The plants that were given both light and food grew horizontally and grew in girth. The plants that were given light, but deprived of food, grew much higher vertically and were considerably thinner.

The results indicate that light is the absolute essential for the existence of D. muscipula. The plants that were deprived of light and were fed probably died the quickest because they used their energy to close their traps. The plants that were given light, but deprived of food, most likely grew higher vertically because they used their energy to grow. This may be nature's way of attracting insects to the nitrogen deficient plants.

Board A
@ 3:00 p.m.

POPCORN
Kathy Kramek
1116 - 16th St., N. W.
Canton, Ohio 44703

The purpose of my project is to find out how popcorn pops and other related questions. Through a number of experiments, I will find out if there is any nutritional value, any presence of starch and evidence of water loss during popping. I will also find out which popcorn pops best and the most efficient way to pop it. In all these experiments I will use three types: white, yellow and Orville Redenbachers' Gourmet.

After performing all my experiments, I found popcorn has a lot of nutritional value and very few calories. Yellow contains more starch than white and pops better, bigger and fluffier. Based on my research, I concluded the type of popcorn purchased and the way it is popped will determine the results.

The newest addition to my project is another type of popcorn, Black Jewel, a patented variety of unique popcorn. Black is its natural color, and it has a very

thin hull which does not allow it to pop as large as other types. Because of the thin hull it shatters and is not left to get caught in the teeth. I performed all of the same experiments with Black Jewel popcorn and compared the results!

Board B @ 3:00 p.m.

MEDIUM PREFERENCE OF MERIONES UNGUICULATUS
Kevin Postma
406 Center Drive
Upper Sandusky, OH 43351

This scientific experiment studied the preference of Mongolian gerbils for different mediums; shredded newspaper, sand, cedar shavings, ponderosa pine shavings with chlorophyll, carpet, and corn cobs. Their preference was judged by the number of times they entered a specific room in a medium selection box. While the gerbils were in a specific room, their behaviors were observed. These behaviors were exploring (rearing), chewing, digging, freezing, self-grooming, running, and thumping. Four Mongolian gerbils were used, and placed in a medium selection box for 30 minutes each. The most preferred medium was shredded newspaper and the most common activity was chewing. The second preferred medium was sand and the most common activity exploring(rearing). The third preferred medium was cedar shavings and the most common activity in that medium was exploring (rearing). The fourth preferred medium was carpet, the fifth preferred medium was corn cobs, and the sixth preferred medium was pine shavings. The gerbils preferred shredded newspaper because the newspaper was needed to build a nest. The preference for sand was caused by heredity. The preference for cedar shavings was caused by early experience. The other mediums were not preferred because they were alien to the gerbils.

Board C @ 3:00 p.m.

NITROGEN-HOW VARIED LEVELS AFFECT PLANT GROWTH
Christina Borgemenke
6253 Mernic Drive
Cincinnati, Ohio 45248

Nitrogen has always been a necessity for plant life and good plant growth. This experiment, using tomato, pepper, and bean seeds planted in sterile soil, tests the effects of varied levels of nitrogen (0.15 g., 0.30 g. and 0.60 g.).

Three conclusions were reached. One, nitrogen absorption is accumulative; two, every type of plant has a different toxicity level for nitrogen; three, leaf structure and size increased with increased levels of nitrogen.

Board D @ 3:00 p.m.

THE EFFECT OF MOODS ON PUPIL DILATION,
Olsen, Jennifer M., 4645 Stonehaven Drive
Columbus, OH 43220

This study investigates how pupil size is affected by positive and negative moods and tests the subject's awareness of associating moods with pupil size.

Five tests were given to 40 subjects to study the effects of moods on pupil dilation. Subjects looked at yellow, blue, and red colored cardboard. There was no significant change in pupil size. Subjects viewed 24 successive pictures; 1/2 depicted positive andl/2 negative situations. 85% of the subjects' pupils were larger while viewing the positive pictures; 10% of the pupils were constant; 5% of the pupils were larger while viewing the negative pictures. Pupil size was measured after 5 seconds of thinking of a happy experience and repeated for an angry experience. 95% of the pupils were larger while thinking of the positive experience; 5% of the pupils remained the same. 90% of the subjects drew larger pupils in a happy face and smaller pupils in an angry face. 90% of the subjects identified a face with large pupils as happy and a face with small pupils as angry.

Findings indicate that in constant light, color has little effect on pupil size. Moods induced by positive visual stimuli and thought dilate the pupils. Moods induced by negative visual stimuli and thought constrict the pupils. Most Subjects associate positive moods with larger pupils and negative moods with smaller pupils.

Board E @ 3:00 p.m.

COLOR GENETICS OF BUDGERIGARS by Joetta Harty, Rt. 2, Corning, Ohio 43730

Much research on the subject of color inheritance in Budgerigars has been done since they were domesticated, over one-hundred years ago. According to this research their color is based on two basic factors; yellow and blue. The removal of the yellow gene from the original green colored Budgerigar results in a blue bird; likewise, the absence of the blue gene creates a yellow bird. Because of this, it has been assumed that the two controlling factors are the respective yellow and blue and their combination results in green. My experimentation is based on the hypothesis I have formed concerning the blue gene. This gene creates the blue Budgerigar. However, the gene is not necessarily blue. In goldfish, the black gene creates a gray, blue, or black fish depending on it's depth beneath the surface skin. The closer to the surface it is, the darker the fish appears. The air and the particles in it serve to dilute the appearance of the black gene. Therefore, I have applied this theory to the controlling "blue" gene in the Budgerigar; my hypothesis being that it is truly black but diluted by particles in the air. To test this hypothesis, I have removed th air from both a green and a blue feather by compressing it. This resulted in the appearance of black in the areas compressed. From this occurence, I was able to deduct that the blue gene is really black and that its blue appearance is due to the depth at which it is located beneath the surface skin and the layers of air in between.

Board F @ 3:00 p.m.

DOWN SYNDROME
Jenny Harbour
509 West Johnson St.
Upper Sandusky, Ohio 43351

Down Syndrome, also known as Mongolism, is a chromosomal abnormality resulting in mental retardation. It is a genetic condition in which a patient has 47 chromosomes instead of the normal 46. The extra chromosome usually is located in the 21st. pair. There are three major types: Mosaicism, Translocation, and the most common form Trisomy 21. A chromosomal analysis is performed to diagnose this condition. In the case study I used I was able to obtain the patient's karyotype from Children's Hospital in Columbus and thus I was able to see the chromosome alignment. Down Syndrome occurs in all races in 1 out of 700 births, but evidence supports the fact that frequency increases with maternal age. 80% of the mothers of Down Syndrome babies are 35 years of age or older. A woman 15-24 runs a 1 in 1,500 risk while a woman 45 has a 1 in 50 chance of having a child with Down Syndrome. The mother in my case study was only 28 and did receive genetic counseling before having another baby. Between the 14th and 16th week of pregnancy an amniocentesis can be performed to detect the problem early. A chromosomal count is determined from the cells in the amniotic fluid sample. I also obtained this report and it showed a normal male karyotype. Research continues in this field. There is no cure. Parents are offered genetic counseling and management classes.

Board G @ 3:00 p.m.

DOES THE SIZE AND SHAPE OF A WINGLET AFFECT THE LIFT OF AN AIRCRAFT? Steven Day, 2844 Whittier Avenue, Dayton, Ohio 45420

A winglet is a device on the tip of an aircraft wing that is used to reduce the drag of an aircraft. This project is a carry-over from one I did last year where I found that different sizes and shapes of winglets affect this drag. Based on those conclusions, I continued in the area of winglets to see if the lift of an aircraft is increased through their use. In order to find out if winglets increase the lift of an aircraft, I made an aircraft and six winglets of different designs out of balsa wood. I then placed the aircraft in a windtunnel I built. I tested the aircraft with no winglets on it, and with each of the six winglet designs. The amount of lift produced was measured by my computer. I found that a winglet that is 13% as tall as the wingspan of the aircraft wing will work the best in increasing the lift of an aircraft. From results the Air Force found, the winglet should be 15% as tall as the wingspan. I also found that the winglet should be the full width of the aircraft wing as opposed to only half of the width of the wing.

SECTION O. ENGINEERING
First Morning Session - Room 112 Hopewell Hall
Saturday, April 30, 1988
James Farison, Presiding

9:00

PACK CEMENTATION COATING OF Ni-BASE ALLOYS,
Vilupanur A. Ravi, Department of Metallurgical Engineering, The Ohio State University, Columbus, Ohio 43210.

Nickel-base superalloy blades and vanes in the gas turbines used for aircraft, marine and power applications experience service in the temperature range 650-1090°C. However, in order to achieve extended operation, these critical materials must withstand environmental attack by hot oxidizing gases and condensates. Consequently, critical gas turbine components are coated by various physical and chemical processes to generate a corrosion-resistant

surface composition to complement a strong, substrate alloy. Halide-activated pack cementation is one of the primary methods of producing such a coating. Al, Cr and Si have been extensively used as the surface alloying elements. Generally this process is restricted to the deposition of individual elements. In the current studies Al, Cr and Si were codeposited in pairs into Ni and Ni-base alloys by greatly reducing the activity of Al in the masteralloy relative to Si and Cr. This presentation describes procedures for codeposition coating, results of computer-assisted evaluation of the complex multicomponent gas phase and the characterization of the coating by X-ray diffraction and scanning electron microscopy/energy dispersive analysis.
Corrosion testing has proved the effectiveness of these coatings.

9:15 Process Modeling of Advanced Composite Materials. Tony E. Saliba, Chemical & Materials Engineering Department, University of Dayton, Dayton, OH 45469

Advanced composite materials have many advantages such as high strength, high stiffness, low weight, and resistance to corrosion. As a consequence, several applications of composite materials have emerged in the aerospace, automotive, and consumer industries. However, the composite processing techniques are not well understood. Several phenomena take place during the manufacturing of composites. These include: heat transfer, resin flow, chemical reactions/crystallization, and void formation. Mathematical modeling of these phenomena can eliminate the expensive experimental trial and error used to determine processing conditions for optimum material properties. Development of these models is essential to the implementation of expert systems in manufacturing. An overview of the process modeling effort is presented along with results from heat transfer, fluid flow, and diffusion codes. The solution technique used in the model development is a novel method that can accommodate complex shaped composites with moving boundaries. These codes can be used to evaluate suitable processing parameters, and are knowledge generators for expert system development.

9:30 APPLICATION OF ADAPTIVE CONTROL IN A STEAM-JACKETED KETTLE
J. W. Tzeng, W. J. Chen and K. Sampson
Ch. Eng., Ohio U., Athens, Ohio 45701

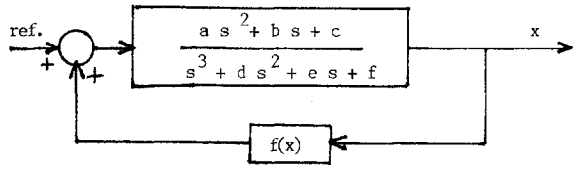
ABSTRACT

An Apple II computer was employed to control a steam-jacketed kettle. Various computer programs simulating adaptive control and PID control were developed and tested. The adaptive control was found better than the PID control based on Cohen-Coon's method or Ziegler-Nichols' method. Though adaptive control is developed primarily for the control of a complex system, it is interesting to see that the adaptive control is also better for the control of a simple steam-jacketed kettle. One inherent advantage of adaptive control is that it determines and updates the process model while controlling the process. Both Cohen-Coon and Ziegler-Nichols methods must be tuned separately.

Several factors were investigated in this study, including the sampling period, the process model and the control algorithm. It was found that for the steam-jacketed kettle, the two-step-ahead control was better than the one-step-ahead control, a second order model was adequate for the process and a one minute sampling period is sufficient.

9:45 CHAOS IN COMPRESSOR SURGE
Tom T. Hartley, Dept. of Electrical Engineering, The University of Akron.

The one dimensional compressor surge model of NASA TM-83639 is studied. It is reformulated into the single loop feedback block diagram shown below. The output of this system, x, is mass flow rate, while the other system parameters are mostly dependent on the present operating point. The nonlinearity in the feedback path is assumed to be in a polynomial form, the simplest useful form being f(x)=x*x*x . Although simple in form, this general closed loop system with a cubic nonlinearity has received very little study. It is shown that this system displays a wide variety of dynamic responses, including limit cycles, jump resonances, both forced and unforced subharmonic resonances, and chaotic behavior. It is demonstrated that the system can bifurcate from stable behavior to limit cycling and chaos. The chaotic responses of the system below are shown to be very similar to the experimental responses reported in NASA TM-83639.



10:00 HOVERCRAFT CONTROL SYSTEM, R. Fred Rolsten, Ph.D., Dean, Shawnee State University, Portsmouth, Ohio 45662 and Ed VonDran, WSU, Dayton, Ohio 45435

Air cushion vehicles (ACV) or hovercraft have been around since the 1950's. The biggest impediment in development of ACV's is the lack of definitive control. The objective of this project was to establish a basic mathematical model of the control aspects of an ACV. To accomplish this improvement in control several component systems were evaluated: (1) The 12 Hp lift system was evaluated for overall efficiency and performance characteristics; (2) the propulsion system was a Rotax 27 Hp two cycle engine; (3) a rudder system of a new design, including elevators, was constructed and mathematically modeled; (4) a control surface or canard, was placed forward of the center of gravity, and was evaluated to determine the improvement in control over heave, pitch and yaw. Because of the increased complexity of the system it was also necessary to reevaluate the cockpit control system. Standard controls remained in the typical positions but the canard and elevator controls were placed for a "neutral" feel.

Preliminary field testing was conducted in order to refine the proposed mathematical model. The results and comparison with the mathematical model will be presented.

10:15 FEEDBACK REDESIGN OF THE ALL-ELECTRIC AIRCRAFT BRAKE, Jon Shearer, Lorale Aerospace Group, Tom Hartley, M.R. Railey, The University of Akron.

The design methodology used in creating the first all electric anti-skid aircraft brake, which was performed by the Lorale Systems Group in Akron, Ohio will be discussed. The closed loop feedback analysis, which is usually performed after completion of the test hardware, is shown to give useful insights into the already completed hardware configuration. It will be shown that better system understanding, as well as considerable time and cost savings, can be gained by performing the closed loop analysis before the actual hardware is constructed.

In the design of the brake, the hardware was constructed to perform the braking task before any analysis of the circuit layout or the closed loop properties of the system were performed. Considerable effort by control engineers lead to the elimination of several ground loops in the circuit and much improved performance. Further control studies have yielded improved dynamic understanding of the system and to ways to reduce the number of devices in the feedback path. Additional efforts have given simulation models which respond exactly as the brake has in its testing. Thus, the analysis has yielded an understanding which was not available before hardware construction. It is suggested that the closed loop analysis should normally be performed before any hardware construction begins in order to minimize both cost and time to final product.

10:30 ROBUST STABILITY ANALYSIS OF LINEAR DISCRETE-TIME SYSTEMS. S. R. Kolla and J. B. Farison, Dept. of Electrical Engineering, University of Toledo, Toledo, OH 43606 and R. K. Yedavalli, Dept. of Aeronautical and Astronautical Engineering, Ohio State University, Columbus, OH 43210.

The problem of determining the stability of a nominally stable system subjected to perturbations (errors) has been an active area of control system research. These perturbations can be described as parameter variations in the system model matrices of the state-space representation. The parameter variations may be independent or dependent.

This paper addresses the stability robustness analysis of linear discrete-time systems $x(k+1) = (A+E)x(k)$ where A is an asymptotically stable matrix. Bounds are obtained on

the linear perturbation matrix E that maintain stability, using Lyapunov theory and singular-value decomposition. The bounds are given on the norm of E for unstructured independent perturbations, and on the elements of E for structured perturbations.

Dependent perturbations are modeled by $E = \Sigma k_i E_i$ where E_i are constant matrices and k_i are uncertain parameters. Stability bounds on k_i are obtained for dependent perturbations. Examples illustrate the stability bounds provided by the new results.

10:45 DYNAMIC PROGRAMMING APPROACH FOR CONTROL OF NON-LINEAR STOCHASTIC SAMPLED-DATA SYSTEMS WITH NON-QUADRATIC CRITERIA. Moufid Elhazzouri and James Farison, Dept. of Electrical Engineering, University of Toledo, Toledo, OH 43606.

The control of non-linear sampled-data systems subject to stochastic disturbances is considered in this paper. It is desired to find the control input that minimizes a non-quadratic function of the system state trajectory and the control input.

The solution of the linear-system/quadratic-performance problem is well-known, and involves linear feedback of the state (or estimate of the state) through specified feedback gains. The general solution for the non-linear-system/non-quadratic-performance problem is not known. The method of dynamic programming, which is well-suited to sampled-data problems, is applied here to that problem. By forming a multivariable Taylor-series expansion of the performance function, a partial differential equation (Hamilton-Jacobi-Bellman equation) is obtained. The solution of the HJB equation gives the optimal control.

The HJB equation is applied to the linear/quadratic case for which the exact solution is known. Comparison of the results, both by the mathematical form and by simulation of a numerical example, gives insight into the effect of truncating the Taylor-series expansion in the derivation of the HJB equation.

SECTION O. ENGINEERING
Second Morning Session - Room 114 Hopewell Hall
Saturday, April 30, 1988
Yung-Tse Hung, Presiding

9:00 COAGULATION OF MUNICIPAL WASTEWATERS FOR ORGANIC POLLUTANTS AND TURBIDITY REMOVAL. Howard H. Lo, Wendy Zayac and Julianne Piskura, Department of Geological Sciences, and Yung-Tse Hung, Department of Civil Engineering, Cleveland State University, Cleveland, Ohio 44115.

The laboratory study was conducted to determine the effects of additions of activated carbon, flyash, and various types of earth materials on the removal of turbidity and TOC (total organic carbon) from municipal wastewaters. Wastewaters were collected from the City of Painesville Water Pollution Control Plant, Ohio. Earth materials used included granite, basalt, shale, limestone, and zeolite. The turbidity of wastewaters increased when powdered granite, basalt, shale, zeolite, and flyash were added with increasing dosages, regardless of mesh size of coagulants and stages of wastewater treatment. However, limestone exhibited different behavior, with decreasing turbidity in the wastewater at higher dosages. Both granular and powdered activated carbon resulted in a decrease in turbidity with increasing dosages. Results for the powdered activated carbon were more drastic in this regard. TOC was measured for the primary and secondary treated wastewaters. Results showed the concentration of TOC in wastewaters decreased as earth materials, flyash, and activated carbon were added for coagulation treatment. The TOC removal efficiency ranged from 8 to 56%. Among these coagulants, the powdered activated carbon proved to be most effective in removing organic carbon from municipal wastewaters with a TOC removal efficiency of 56 percent.

9:15 POTATO WASTEWATER TREATMENT WITH ANAEROBIC YEAST FILTERS FOLLOWED BY ACTIVATED SLUDGE PROCESS. Nian-Fa Tang*, Yung-Tse Hung*, Frank L. Horsfall**III, *Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115, **General Environmental Science Corp., Beachwood, Ohio 44122

The purposes of this laboratory investigation were to determine the feasibility of anaerobic yeast filters followed by activated sludge process for treatment of potato wastewaters and to determine the performance of this combined treatment system. Parameters examined included types of packing media and types of bio-augmentation in the anaerobic filters; hydraulic detention time, sludge age and types of prior treatment for the activated sludge process. During the initial period of filter run for the anaerobic filters the chemical oxygen demand removal was from 20 to 28 % for the anaerobic yeast filters and 57 to 76 % for the anaerobic sludge filters. The performance of yeast filters improved as reactor run time increased. The COD removal efficiency was about 95 % for anaerobic filter using granular activated carbon as packing media. Bio-augmentation with bacterial culture product addition (LLMO) increased a mere 1.7 % COD removal. In the activated sludge reactors the COD removal efficiency varied from 86 to 91 % for treating effluent from anaerobic yeast filters, and varied from 79 to 80 % for treating effluent from anaerobic sludge filters.

9:30 BIO-AUGMENTATION PROCESS FOR TWO-STAGE ANAEROBIC-AEROBIC TREATMENT OF HIGH STRENGTH FOOD PROCESSING WASTEWATERS. Pi-Chang Jen*, Yung-Tse Hung*, Frank L. Horsfall, III**, *Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115, **General Environmental Science Corp., Beachwood, Ohio 44122

The laboratory study was conducted to determine the effects of bio-augmentation on the two-stage anaerobic-aerobic treatment of high strength combined potato and sugar wastewaters. Parameters examined included feed strength and bio-augmentation application for anaerobic filters; feed strength, hydraulic detention time, sludge, and bio-augmentation application for activated sludge reactors. Bio-augmented activated sludge reactors had better organic removal rate and lower sludge production than the non-bio-augmented reactors. Little difference was observed between the bio-augmented and non-bio-augmented anaerobic filters regarding organic removal and gas production. Results of batch activated sludge reactor study indicated that less hydraulic detention time would be needed in the bio-augmented reactors compared to the non-bio-augmented reactors.

9:45 MULTI -STAGE ANAEROBIC FILTER PROCESS FOR MILK WASTEWATER TREATMENT. Frank C. Mbachu, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

The objective of this study was to evaluate the effectiveness of multi-stage anaerobic filters for treatment of milk wastewater. Effect of bio-augmentation on the anaerobic filter performance was also investigated. Experimental setup consisted of two trains of four filters in series. Plastic packing media was used in the first, second, and third stage filters, while activated carbon and crushed charcoal were used in the fourth stage filters. Organic loading rate for the first stage filters ranged from 15 to 200 lb COD (chemical oxygen demand) / 1000 cu. ft / day. The milk wastewaters contained 900 to 17,000 mg/l COD and 200 to 4000 mg/l TOC (total organic carbon). Parameters examined in the anaerobic filter run included hydraulic detention time, gas production rate, pH, and TOC. Overall TOC removal efficiency for the multi-stage anaerobic filter process ranged from 56 to 90 %. The bio-augmentation slightly improved the TOC removal by 2 % for the multi-stage anaerobic filter process.

10:00 BIO-DEGRADATION OF CHLORINATED HYDROCARBONS IN WASTEWATERS. Majid Zarrinafsar, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

This paper describes the bio-degradation of chlorinated hydrocarbons in wastewaters and the determination of bio-kinetic parameters. A mixed culture of microorganisms was grown on phenol as a sole carbon source. The chlorinated hydrocarbons were exposed to microorganisms. The concentrations of the chlorinated hydrocarbons were determined using chromatographic techniques in 2 hours interval. The microorganisms concentrations were measured using a spectro-photometer and the absorption peaks at 420 nm. A mathematicl formula was developed which related the bacterial cell density with absorption peak at 420 nm. Four bio-kinetic parameters: specific rate of endogenous respiration, maximum yield coefficient, saturation constant, and ratio of the maximum specific growth rate to the maximum yield coefficient, were determined.

10:15 PRINCIPAL COMPONENT ANALYSIS OF THE TWO ALTERNATIVE TECHNIQUES FOR DETERMINATION OF ORGANIC POLLUTANTS IN WASTEWATERS. Majid Zarrinafsar, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

This paper describes the use of principal component analysis method using two alternative techniques in the determination of organic pollutant level in wastewaters.

For organic pollutant level measurements chemical oxygen demand (COD) and total organic carbon (TOC) tests were conducted. Theoretical COD and TOC values were computed for known organic compound present in wastewaters. The statistical techniques necessary to analyze the data was more complicated than the least-square linear regression. The principal component analysis (PCA) method used two components. The first measured analyte concentration, while the second measured aggregate interaction (errors). The experimental conclusions were in fair agreement with those obtained using modeled data, which had been constructed to simulate known specific conditions.

10:30 FILTRATION OF OILY SLUDGE (DELIQUIFICATION BY PRECOAT VACUUM FILTRATION AND FILTER PRESSES). Richard B. Stalzer, Standard Oil Company, and Bahman Ghorashi, Cleveland State University, Chemical Engineering Dept., Cleveland, Ohio 44115.

Petroleum refineries generate significant quantities of oil contaminated sludge as a result of various operations. The major source of oily sludge is from wastewater treatment operations. Primary sources of solids associated with the sludge are the solids in crude oil which are removed in the various refining processes and coke fines. The purpose of this study was to evaluate the process parameters that influence oily sludge deliquification by precoat vacuum filtration and filter presses, and to determine the effect and relative importance of feed oil on process performance. Cake characteristics and oil recovery for the two processes are also compared.

10:45 ARTIFICIAL INTELLIGENCE LANGUAGE PROLOG - Application to Civil Engineering Problems. Salahuddin Ahmed and Benjamin Koo - grad. student and prof., The University of Toledo, Civil Engineering Dept., Toledo, Ohio 43606.

The computer language PROLOG is developed as a symbol manipulator and has been used for Artificial Intelligence Applications. It is a descriptive type language and is not necessary to define each step of computation explicitly. The language provides an advantage to solve Civil Engineering problems whose solutions often depend on professional judgement and experience.

The disadvantage of PROLOG is the speed of execution because of extensive backtracking and numerical computations. However, it can be overcome by interacting with programs written in languages such as FORTRAN.

An expert system has been developed by the authors to analyze and design stub-girder floor structural systems using a personal computer. Easy inputs and adequate "help" and "why" functions are provided. A natural language scheme can afford using a key-word search technique.

SECTION O. ENGINEERING
Afternoon Session - Room 112 Hopewell Hall
Saturday, April 30, 1988
James Farison, Presiding

1:30 SECTION BUSINESS MEETING

2:00 HELMET CENTER OF MASS DEVICE, R. Fred Rolsten, Ph.D., Dean, Shawnee State University, Portsmouth, Ohio 45662 and Aygun Karakas, B.S., WSU, Dayton, Ohio 45435

A static device was designed, constructed and used to measure the center of mass of three commercial/military helmets. The data were compared with U.S. Army data and concordance is excellent. Such data are necessary for the helmet designer as well as the human factors engineer. The center of mass of the helmet must coincide with the center of mass of the human head. Attention must be focussed on the attachment to the helmet/head of various items such as visors, oxygen mask, communication systems, and night vision goggles.

2:15 WAVY SURFACES IN MEDIA, R. Fred Rolsten, Ph.D., Dean, Shawnee State University, Portsmouth, Ohio 45662 and Nick Kiritsis, B.S., The Ohio State University, Columbus, Ohio 43210

Ripples can be formed on metals under a variety of impact loading conditions, such as the impact of bullets at oblique angles on plates, the collision of two plates accelerated with explosives, the movement of high pressure gas over a metal plate and the impact of hypervelocity particles into a stack of thin plates.

Ripples can also be observed on fluids like the ripples formed on the quiet surface at a lake when disturbed. The movement of a fluid (air) over sand can also cause a rippled surface.

This is a study focused on the understanding of the theory behind the formation of ripples in different media, formed using various techniques and based on all published experimental data. Finally an attempt has been made to compile all the existing published data for ripples produced in various ways and with different media in order to establish a theory of ripple formation.

2:30 LINEAR 3-D MECHANISM FOR GENERATING FINITE ELEMENT MODELS. Mehdi Pourazady, Matthew Schwiebert, Dept. of Mechanical Engr., University of Toledo, Toledo, OH 43606

An apparatus for recording the geometries of irregularly shaped, 3-D models into a PC for Finite Element Analysis has been built. The setup consists of a three-dimensional Cartesian-type mechanism interfaced to a personal computer by a 12-bit A/D converter. More specifically, the mechanism utilizes three ten-turn potentiometers to record the displacements of a pointer in the form of three voltages representing "x", "y" and "z" coordinates. The motion of the pointer is constrained by sliders allowing each potentiometer to measure an independent coordinate. A 12-bit A/D board converts these voltages into integer values which are read into a personal computer. A FORTRAN program converts these integer values into the actual coordinate positions of the pointer and stores them. A network (or grid) consisting of several of these recorded points, or "nodes", along with their characteristic boundary conditions describe the geometry of the model for an appropriate Finite Element software package.

2:45 DEVELOPMENT OF A FINITE-ELEMENT COMPUTER SIMULATION FOR PREDICTION OF THREE-DIMENSIONAL TEMPERATURE PROFILES IN INTERSTITIAL HYPERTHERMIA. Masoud Panjehpour and James Farison, Dept. of Electrical Engineering, University of Toledo, Toledo, OH 43606 and Andrew Milligan, Dept. of Radiation Therapy, Medical College of Ohio, C.S. 10018, Toledo, OH 43699.

Treatment of cancer tumors with hyperthermia alone or in combination with radiotherapy has gained increased popularity in recent years. Nonuniformity of blood flow, the major cooling mechanism, introduces difficulties in obtaining uniform temperature distribution within the treatment region. When planning hyperthermia treatments, it is desirable to be able to predict the temperature distributions so treatment effectiveness can be optimized. Since temperature can be measured at only a limited number of locations, the temperature in the majority of the tissue remains unknown.

This paper describes the development of a computer simulation package to predict three-dimensional temperature distributions during RF interstitial hyperthermia treatments. The Finite Element Method is used because it permits solution of the bio-heat transfer equation subject to complicated conditions: irregular geometry of normal and enclosed tumor tissue, nonuniform perfusion rates, and nonuniform thermal properties of the tissue. Simulation results are shown for a variety of conditions to illustrate the flexibility of the package.

3:00 MICROPROCESSOR BASED MEASUREMENTS AND ANALYSIS OF THE MOTION OF A HUMAN BODY JOINT. M. Y. Niamat and R. G. Molyet, Dept. of Electrical Engineering, The University of Toledo, 2801 W. Bancroft St., Toledo, OH 43606.

The techniques for measuring and analyzing the motions of human body portions are often necessarily sophisticated and complex. This research work provides for the improvement of the measurement of the motion which is associated with a human body joint by modifying an existing measuring apparatus to incorporate a microprocessor system. This is accomplished by replacing the instrument encoder with two precision potentiometers and an analog to digital (A/D) converter. Utilizing two potentiometers allows for the separate measurement of angular displacement and angular rotation. The output of the A/D converter is interfaced to

a 16-bit microprocessor system to provide both online and offline data processing and storage capabilities. The modified apparatus not only makes more detailed angular measurements possible, but also allows data collection and analysis. In addition, the improved apparatus enhances the evaluation of the progress of patients who are undergoing rehabilitation therapy as a result of joint or limb injury.

3:15 PROPERTIES OF ITERATIVE IMAGE RECONSTRUCTION ALGORITHMS. Behrouz Shabestari and James Farison, Dept. of Electrical Engineering, University of Toledo, Toledo, OH 43606.

Due to advances in the areas of VLSI and digital computers, iterative image reconstruction algorithms have become feasible. This paper investigates several iterative methods, including the Algebraic Reconstruction Technique and the Iterative Least-Squares Technique.

Convergence of these two algorithms is discussed in terms of their matrix representations. It is shown that each optimizes certain properties of the image reconstruction. An alternative to the Iterative Least-Squares Technique is given in vector notation and is generalized to partitioned matrix form. This method is based on averaging the backprojection correction in the least-squares sense for each iteration. It converges to the (optimum) image that is the least-square solution in the case of a full column rank projection matrix, with proper choice of initial image.

The similarity and comparisons of the methods are revealed by the matrix models. The precalculated image reconstruction matrix from the matrix expression of each method permits the direct calculation (single-pass) of the reconstruction equivalent to any finite number of iterations.

3:30 GAIN/SHAPE VECTOR QUANTIZATION FOR DIGITAL TV PICTURE TRANSMISSION. Maunmaun Tin N. Pu and James Farison, Dept. of Electrical Engineering, University of Toledo, Toledo, OH 43606.

A standard frame of TV picture consists of 760x480 pixels, and changes at a rate of 30 frames/sec. To transmit the discrete pixel values digitally, extensive bandwidth is required. Bandwidth reduction (data compression) is essential for digital TV transmission.

For digital transmission, the analog TV waveform is sampled and quantized. The sampled-quantized pixel values are then binary coded. By ordinary scalar quantization (sample-by-sample), 4-8 bits/sample are required. However, with vector quantization (sequence of samples), less than 1 bit/sample may be necessary. Further advantage may occur if the samples are first transformed, then vector quantized.

This paper describes gain/shape vector quantization in the transform domain, and presents experimental results for its application to digital TV transmission. Gain refers to the length of the vector to be quantized; shape refers to direction of the normalized vector. The transform is the discrete cosine transform. The gain is scalar quantized, the shape is vector quantized. The reconstructed picture is obtained by combining the gain and shape, and inverse transforming. Results are measured in terms of bit rate (efficiency) and error rate (quality).

SECTION R. ECOLOGY
Morning Session - Room 106 Hopewell Hall
Saturday, April 30, 1988
S.J. Diakoff, Presiding

9:00 TO IMPROVE PREDICTING IN THE STUDY OF LIVING SYSTEMS. C. A. Hilgartner, M. A. Bartter, R. V. Harrington. 254 Kensington Pl., Marion OH 43302

The theme, "Our World -- One Environment," implies the following hypothesis: "To treat our world rigorously as a single comprehensive surround will yield predictions likely to survive testing." The construct of environment forms half of the polar term-pair organism/environment. Empirically we cannot separate what these two constructs refer to. Any actual organism (e.g. a grey squirrel) prevented from engaging in two-way transacting with even a part of its environment (e.g. air) cannot continue to live. But our biological theories fail to represent things that way. Instead, they artificially separate these constructs, treating them as independent rather than polar, and isolated from each other. At best they secondarily re-combine them. Then, instead of describing the relation between them in terms of the construct of transacting, a living relationship, they describe each in terms of the mechanical construct of interacting. This should not surprise us, since to use the construct of transacting requires that we define the construct of living, specifying what distinguishes a living system from a non-living one; and we haven't known how to do that. The authors have developed a theory which yields a rigorous and testable criterion for the construct of living. It specifies what distinguishes a living system from a non-living one, and develops a notation to take these aspects into account. In this paper, we test the theory by utilizing it to account for some classic observations concerning the chemical composition of living systems.

9:15 SUPPRESSED REPRODUCTION AND GROWTH OF MOURNING DOVES AND AMERICAN ROBINS AT A NUCLEAR REPROCESSING PLANT.

David R. Osborne and Raymond H. Sperger, Department of Zoology, Miami University, Oxford, OH 45056.

To test the hypothesis that bird populations are healthy at a nuclear reprocessing plant we studied the growth and reproductive success of Mourning Doves and American Robins. Results showed considerable species and site differences. Hatching and fledging success of doves were reduced in dove populations downwind of the production site, but not in robins. Nestlings of on-site doves did not differ significantly in any of the growth parameters measured. On-site robins showed significant suppressed growth in 5 of the 6 prefledging growth parameters measured. Species differences in suppressed growth are attributed to differences in diet and to potential differences in accumulating chemical/radiological loads.

9:30 MULTIPLE-MALE GROUPS IN THE AMERICAN GOLDFINCH. Susan K. Frank and David W. Waller. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Past studies of American Goldfinch (Carduelis tristis) indicate breeding pairs typically separate from large groups during the reproductive season. However, conspicuous parties of birds, predominantly males, may be found at times throughout the summer, especially during nesting. Observations of established breeding pairs and other individuals were conducted from June to October 1987 at a site in Summit County, Ohio. The occurrence of males, changes in sex ratios and other breeding-season activities were recorded. The existence of groups of excess males was established. Multiple-male group size of 4.8 in August decreased to 2.3 in September. This shift coincided with the beginning of the second nesting cycle, indicating some excess males leave at this point. Feeding of juveniles was carried on by some males, until completion of fledging of the second brood, when female feeding of juveniles was observed. The level of male feeding was proportional to numbers of males present, indicating excess males may participate, at least until second nesting. The excess males may be satellite males who not only feed chicks but also occasionally mate. The tolerance of satellites by the mated pairs may be explained by the energy advantage in feeding chicks. Also, excess males can assist in detecting and driving away predators and in locating suitable food sites.

9:45 PRESENCES AND ABSENCES OF SELECTED SMALL PASSERINES CHARACTERISTIC OF SHRUBBY WETLAND HABITATS. Trevor F. Vidic and David W. Waller, Department of Biological Sciences, Kent State University, Kent, Ohio 44242

The Marsh Wren, Swamp Sparrow, Willow Flycatcher, Common Yellowthroat, and Song Sparrow are passerine species usually found together near or within the shrub borders of northeastern Ohio wetlands. To determine degrees of association of the species, the Audubon Society Breeding Bird Censuses (1937-1984) conducted in northeastern U.S. and southeastern Canada where these birds share a common summer range were examined. Of these, 255 censuses were done under vegetative profiles judged attractive to the species. Tallied presences and absences for each species per census were compiled for testing (Pearson's chi-square) and for measuring (Cramer's phi coefficient) the relative association of each species with each of the others. Results indicate association is generally less pronounced among the five species beyond northeastern Ohio, with the highest degrees of association between Willow (Traill's) Flycatcher and Swamp Sparrow or Common Yellowthroat. Surveyed occurrences of the species did follow a gradient sequence of foliage preferences reported in earlier censuses of Ohio bogs, swamps, and marshes. Aside from detection difficulties, microhabitat variation and ecological displacement are among the possible factors operating against encountering these species together in habitats seemingly conducive to them.

10:00 USE OF AGRICULTURAL HABITATS BY THE WHITE-FOOTED MOUSE, *PEROMYSCUS LEUCOPUS*. John R. Cummings and Stephen H. Vessey. Department of Biological Sciences, Bowling Green State University, Bowling Green, Ohio 43403

Changes in land use in Ohio since the early 1900's have resulted in a drastic reduction of woodland habitat. Much of the landscape in Northwest Ohio has been converted to agricultural use; in Wood County less than three percent of the land remains wooded. To better understand the use of various habitats, especially agricultural lands, by native small mammals, we studied the abundance and movements of one of Ohio's most common and widely distributed rodent species, the white-footed mouse (*Peromyscus leucopus*). Four different habitat types were sampled using mark and recapture techniques: woods, woods edge, roadside ditches, and crop-fields. A fifth habitat type, farmsteads, was sampled by the removal method. Radiotelemetry was also employed to investigate the movements of these rodents into and out of the various habitat types. White-footed mice were present in all habitat types and freely moved from one type to another. Seasonality affected movement patterns: in the early spring the favored habitat was the woodlot, but as crops developed in the surrounding fields, mice moved into them. After harvest began there was an influx of mice to neighboring farmsteads, ditches and woods edge. Weather affected trappability, with a higher percentage of animals being caught on rainy days in all habitats. Radiotelemetry revealed that mice living in ditches and fields used underground tunnels, some of which extended more than one meter below the surface. Woods-dwelling mice nested in hollow logs or trees. Males had larger home ranges than females; this difference was due, in part, to brief forays by males of 30 meters or more from the nocturnal foraging area. Our data suggest that populations of white-footed mice are less restricted to woodlots than previously had been thought, making extensive use of surrounding habitats.

10:15 NEW DISTRIBUTIONAL RECORDS OF NORTH AMERICAN FAIRY SHRIMPS (CRUSTACEA: ANOSTRACA) AND THE COEXISTENCE OF SPECIES. Ralph W. Dexter, Dept. Biological Sciences, Kent State University, Kent, Ohio 44242.

New state and regional records are reported for Branchinecta lindahli (MT), B. cornigera (Devon Is., Can.), Eubranchipus holmani (AL), E. serratus (IA and AZ), Streptocephalus seali (GA), S. texanus (MS), S. similis (Oax., Mex.), S. dorothae (NB), and Artemia salina (TX). New county records for E. vernalis in Ohio are reported for Ross, Williams, Trumbull, Ottawa, Sandusky, Greene, Belmont, Hocking, Huron, Fulton, Erie, and Pike Counties. Over 50 records are known from the literature of multiple spp. (usually 2, but a few records of 3-5) occurring in the same temporary pond, involving 21 spp. in 26 states of the U.S. and 3 provinces of Canada. Twelve new records are reported from 4 states (NB, NM, AZ, CA) involving 8 spp. (3 cases of 3 spp. together; 1 case of 4 spp. together). One pond in Ohio has had 2 spp. together for at least 28 years. Known geographic ranges are expanding as more collecting is done. Finding multiple species together is becoming more common. Coexistence may prevail rather than competitive exclusion in certain cases.

10:30 THE DISTRIBUTION OF HERBACEOUS PLANTS AND WOODY SEEDLINGS IN A SOUTHWESTERN OHIO FOREST ISLAND: Brent G. DeMars & James R. Runkle, Department of Biological Sciences, Wright State University, Dayton, Ohio 45435

The distributions of herbs and seedlings were sampled in 8 sections of the WSU woods. Each site was sampled using 100 random 1 m^2 plots. The sites included 3 upland remnant, 2 secondary growth (35 & 55 yrs. old), 1 remnant slope, 1 remnant floodplain, and 1 edge. A total of 13 environmental parameters were measured. In all sites a total of 144 species were observed. Many differences are apparent. For instance, Dentaria laciniata, a spring ephemeral, was abundant in all sites except secondary stands. Woody seedlings were found more important in secondary stands. The distributions of species and groups of species determined by life history attributes will be related to variations in topography & stand history and also the unique environments of individual sampling plots. Both ordination and standard statistics will be used.

(The previous represents a M.S. thesis which is still in preparation as of 12/4/87.)

10:45 FACTORS AFFECTING SEED GERMINATION IN A NUTRIENT AMENDED OLD-FIELD ECOSYSTEM. Beaudoin, R. R. and L. A. Kapustka. Department of Botany, Miami University, Oxford, OH 45056.

The Ecology Research Center at Miami University, Oxford, Ohio, has been the site of an ongoing study of the effects of sludge and fertilizer amendments on an old-field ecosystem (Hyder and Barrett, Ohio J. Sci. 86(1):10-13; Arnold and Kapustka, Ohio J. Sci. 87(4):112-114). Significant differences in NPP, species diversity, and mycorrhizal colonization exist among treatments. We assessed the effects of long-term nutrient amendment on seed germination. Seeds of Barbarea vulgaris, Bromus japonicus, Festuca elatior, and Rumex crispus were collected in the field, then dried and stored at room temperature. Shortly after harvest 4 batches of 50 seeds per treatment were germinated in petri dishes. Plates were checked regularly and scored for number of seeds germinated. All 4 species exhibited significant differences in rate of germination among treatments (i.e. seed source). The final germination percentage of Rumex crispus was significantly different among treatments. We propose that factors such as soil pH and metal toxicity, which are associated with nutrient amendment, may be exerting selection pressures that influence germination behavior. A complimentary study on seedling establishment, currently under way, should provide additional information regarding the population dynamics of these early life stages.

SECTION R. ECOLOGY
First Afternoon Session - Room 106 Hopewell Hall
Saturday, April 30, 1988
David R. Osborne, Presiding

1:30 SECTION BUSINESS MEETING

2:00 MOVEMENTS, DENSITY, AND HOME RANGE SIZE OF THE CENTRAL STONEROLLER (CAMPOSTOMA ANOMALUM) IN A SMALL OHIO STREAM. Neal D. Mundahl, Department of Zoology, Miami University-Middletown, 4200 East University Boulevard, Middletown, Ohio 45042.

A population of central stonerollers (Campostoma anomalum) in Harker's Run, Butler County, Ohio, was examined during autumn, 1980, to determine the species' movements, density, and home range size. During the 5-week study period, 170 fish were marked by fin clips and released in the 187-m study section. Eighty percent of the recaptured, marked fish (20) were recaptured in their initial capture area (pool or riffle). No recaptured fish moved more than 95 m. Density estimates for each pool and riffle within the study section ranged from 0.10-3.91 fish/m^2 (mean = 1.25 fish/m^2). Home range size was estimated to be 36.0 ± 8.7 m (mean ± 95% CI). Stonerollers in Harker's Run occur at densities similar to those reported for the species in other streams, and their home ranges in this stream are of a size similar to those of other small, stream-dwelling fishes.

2:15 EFFECTS OF METACERCARIA ON GROWTH AND THERMAL TOLERANCE OF SPOTFIN SHINERS (NOTROPIS SPILOPTERUS), STRIPED SHINERS (NOTROPIS CHRYSOCEPHALUS), AND BLUNTNOSE MINNOWS (PIMEPHALES NOTATUS). Christopher T. Hockett, Department of Zoology, Miami University-Middletown, 4200 East University Boulevard, Middletown, Ohio 45042.

Spotfin shiners (Notopis spilopterus), striped shiners (Notropis chrysocephalus), and bluntnose minnows (Pimephales notatus) were collected from Dicks Creek (water temperature = 11° C) in southwestern Ohio and examined for the effects of metacercaria (Uvulifer sp.?) parasite load on their growth and critical thermal maxima (CTMax). Parasite infestation ranged from 5-535 metacercaria per fish (mean = 134) and did not differ significantly among the species. All fish collected were 1 or 2 years old, and showed no adverse effect from parasite burden on growth (length or weight). Mean CTMax values were not significantly different among the species (spotfin shiner: 31.8° C; striped shiner: 30.6° C; bluntnose minnow: 31.3° C), nor among fish with differing parasite loads. These results suggest that metacercaria parasite load (up to 535 per fish) has no observable effect on the growth or thermal tolerances of spotfin shiners, striped shiners, or bluntnose minnows.

2:30 EVIDENCE FOR A BACTERIAL SUCCESSION ON DEGRADING ALDER (ALNUS GLUTINOSA) LEAVES IN A FRESHWATER STREAM. *Ingrid A. Harris and Peter A. Dixon, *4466 Dublin Rd., Cols., OH 430

Bacterial colonization of alder leaves over the 6-8 week decay period in a freshwater stream was monitored using scanning electron microscopy. Dried alder leaves were populated by yeast cells which declined in abundance during the first week of incubation and were not observed thereafter. Rod-shaped bacteria, typically 1-2 uM x 0,5-1 uM colonized the leaves within 24 hours of being incubated in the stream. Intermediate-length

bacilli, 4 uM x luM followed within the next 7 days and prosthecate organisms were observed after 7 days and became more abundant after 2 weeks incubation. Unbranched flexuous bacilli appeared after 2 weeks becoming more abundant after 3 wks. incubation. Isolated aggregations of cocci were present on all samples. Chains of flexuous bacilli separated by what appeared as "discs" and chains of bacilli which had squared corners colonized after 3 weeks incubation. The specific colonization pattern of degrading alder leaves suggests that the bacteria colonized in response to a changing variable related to the leaves.

2:45 THE DISSOLVED ORGANIC PHOSPHORUS (DOP) COMPOSITION OF AN ACID BOG LAKE IN PORTAGE COUNTY, OH. A.C. Edinger and R.T. Heath. Department of Biological Sciences, Kent State University, Kent, OH 44243.

The composition of the dissolved organic phosphorus (DOP) pool in surface water from Triangle Bog Lake, a glacial acid bog, was examined seasonally. The traditional view of phosphorus dynamics holds that both bacteria and phytoplankton take up orthophosphate in an attempt to satisfy their phosphorus requirements. A second model states that bacteria outcompete algae for orthophosphate and thereby limit algal growth. Algae obtain their phosphorus in some form other than orthophosphate; this source may be dissolved organic phosphorus (DOP) compounds such as phosphomonoesters, phosphodiesters, nucleotides, phospholipids, and polyphosphates that are released from bacterioplankton following their uptake of phosphate. The purpose of this work was to determine the composition of rapidly labelled DOP using radiometric procedures. Freshly collected 5 ml water samples, radiolabelled with carrier-free 32P orthophosphate and fractionated by Sephadex G-25, chromatographed as did orthophosphate in a control experiment. Radiolabelled water, both centrifuged (27,000g for 15 minutes) and uncentrifuged, incubated for 24 hours at ambient temperature and run through the Sephadex column, indicated that the 32P orthophosphate was associated with high molecular weight compounds.

3:00 THE EFFECT OF BACTERIAL COPREDATORS ON ALGAL CULTURES CONTAINING BLUE GREEN AND GREEN ALGAE. Earl C. Heath, Jeffrey C. Burnham and Peter C. Fraleigh; Medical College of Ohio and University of Toledo; Toledo, Ohio 43699

Selective bacterial predation of blue green algae has been reported by Burnham(1981,84), Mahoney et. al.(1986), Fraleigh(1986) and Heath et. al.(1986,87). In these studies the bacterial predators Myxococcus fulvus strain BG02 and Actinomycete strain P30 were used alone with cultures containing both blue green(cyanobacteria) and green (chlorophyte) algae. Within five days the predators caused the cell density per mL of the blue green algae to decrease to less than 1% of the orginial density while the green algae increased slighty. In this study the BG02 and P30 predators were used together as copredators in cultures containing both Aphanizomenon flos-aquae (cyanobacterium) and Scenedesmus obligatus(chlorophyte). The cell density per mL of the Aphanizomenon decreased to less than 1% of the orginal density and the cell density per mL increased 10% over the orginal density within two days. The same results were obtained when the BG02 and P30 were used as copredators in cultures containing Nostoc muscorum and Scenedesmus. The faster decline of the blue green cell densities, two days using copredators compared to five days using a single predator suggests that the copredatory system could be more efficent in controlling the growth of blue green algae.

3:15 PIGMENT PRODUCTION DURING GROWTH OF MICROCOCCUS LUTEUS ON PYRIDINE

E. O'LOUGHLIN / G. K. Sims. Department of Agronomy, 2021 Coffey Road, The Ohio State Univ., Columbus, Ohio 43210.

Micrococcus luteus isolated from soil was grown on pyridine as a sole source of carbon, nitrogen and energy. The organism produced a fluorescent pigment during growth on pyridine, but not during growth on glucose, succinate, 4-aminobutyric acid, or nutrient broth. The pigment was recovered from growth medium by extracting freeze-dried culture supernatant with methanol. The material was then purified by crystallization and thin layer chromatography. The pigment co-chromatographed with riboflavin in two thin layer and two high pressure liquid chromatographic systems. Melting point and fluorescence characteristics of the pigment were identical to authentic riboflavin. Studies with labelled pyridine revealed that the pigment may not be directly produced from the pyridine ring.

3:30 PHYSIOLOGICAL AND DEVELOPMENTAL DIFFERENCES BETWEEN COAL SPOIL AND OLD FIELD POPULATIONS OF ANDROPOGON VIRGINICUS L. James E. Nellessen. Botany Department, Ohio University, Athens, Ohio 45701.

Andropogon virginicus is an old field species and a dominant on abandoned coal mine spoils. Observations of plants in situ, in reciprocal transplants at 3 coal spoils, in 3 old fields and in a uniform garden indicated that some populational differences may be environmental and others genetic. Mean chlorophyll content in 1986 for in situ old field plants for July, Sept., and the garden were, respectively, 2.52, 2.85, and 5.04 mg/l. For mine spoil plants these means were 2.05, 2.17, and 5.25 mg/l. Chlorophyll content in 1987 in old fields for Sept. and the garden were 2.90 and 4.82 mg/l, respectively. The mine site data was 2.32 and 4.93 mg/l. Measurements of photosynthetic rates showed mine spoils to be 40-70% of old fields. Photosynthetic rates of old leaves were 50-90% of young leaves. Reciprocal transplants showed a greater reduction in photosynthetic rate from old field to mine, 40-60%, than from mine to old field, 10-20%. There were no similar reductions in transpiration rates. Rate of plant maturation was more a function of individual populations than it was of habitat type. Seed germination experiments indicated a greater tolerance to osmotic stress for old fields and greater tolerance to pH differences for mines. Seed germination in old fields was rare. In mine spoils, seed germination depended greatly on local site conditions.

3:45 SEXUAL DIMORPHISM IN EARLY MEADOW-RUE. D.W. Waller, K.A. Walasik, and J.M. Cuidubaldi. Department of Biological Sciences, Kent State University, Kent, Ohio 44242.

Early Meadow-Rue (Thalictrum dioicum L.) is a spring-flowering ranunculaceous herb of the eastern North American forest. It is fully dioecious and thrives colonially at disturbed sites, as do many dioecious subcanopy plant species. Members of a ravine colony in Summit County, Ohio, were examined for other characteristics possibly related to dioecity. Most rhizomes had one shoot each; a few had 3-5. Of 138 shoots, 52 were flowering. Of these, exactly 26 were male and 26 were female. Where multiple shoots occurred, all were the same gender. These conditions suggest a deterministic mechanism of gender development. Inflorescence and flower forms indicate anemophilous pollination. Numbers of flowers of each shoot averaged 33.2 in males and 26.8 in females, a ratio of 1.24. Numbers of stamens in 73 flowers of 3 shoots averaged 24.3, while numbers of carpels in 65 flowers of 3 shoots averaged 7.7, a ratio of 3.15. These contrasts may be related to pollination and seed-set energetics and to the species' trichotomous morphology. The number of initially expanded leaflets of flowering shoots averaged 82.5 in males and 107.7 in females, a ratio of 1/1.30, close to the reciprocal of the flower-number ratio. This would also be consistent with an energetic/anatomical interpretation of flower dimorphism.

4:00 AN AQUATIC METABOLIC RATE EQUATION J. Verduin, R 4 Box 202, Carbondale, IL 62901

This paper presents an aquatic metabolic rate equation: $T_b \times E_z \times \Delta ph_{(d,n)} \times 80 = \Delta CO_2$ where T_b = titratable base, meq liter^{-1}
E_z = euphotic zone thickness, m
ΔpH_d = diurnal gain in pH
Δph_n = nocturnal drop in pH, and
80 represents the millimoles of ΔCO_2 m^{-3} per unit of Δph when titratable base = 1.0.

To use this equation one need only measure titratable base, light penetration, and the early morning and midafternoon pH. A somewhat improved nocturnal ΔpH can be obtained by sunset and sunrise pH readings. When ΔpH_d is inserted one estimates the diurnal net photosynthesis, and when ΔpH_n is inserted one estimates the nocturnal community respiration. Yields are in millimoles ΔCO_2 per m^2 per day. Nocturnal respiration rates can be added to diurnal net photosynthesis to obtain an estimate of gross photosynthesis

SECTION R. ECOLOGY
Second Afternoon Session - Room 108 Hopewell Hall
Saturday, April 30, 1988
Horton H. Hobbs, III, Presiding

2:00 SITING CRITERIA VS. ENVIRONMENTAL IMPACT STATEMENTS FOR DECISION-MAKING IN HAZARDOUS WASTE SITING. W. B. Clapham, Jr. Department of Geology, Cleveland State University, Cleveland, Ohio, 44115.

The three most common mechanisms for guiding hazardous-waste facility siting decisions are regulations, environmental impact assessments, and siting criteria. Of these, the third is the least common and the most effective. It is the approach used in Ohio.

Regulations provide a minimum standard for facilities, concentrating on facilities' operating parameters. They try to be neutral with regard to site-specific limitations. They may not be sufficient to insure that facilities will not be built in unfavorable areas.

Environmental Impact Assessments require that siting agencies assess the implications of facility construction and operation on the environment in which they are constructed. They must typically compare alternatives, but assessing the impact does not always succeed in minimizing that impact.

Siting criteria set performance standards for facilities' design and operating standards before a permit can be issued. They tend to be rather limited and are inherently very site-specific. They also tend to be easier and faster to implement than environmental impact assessments, and they are more effective than regulations in insuring that facilities are built in areas in which they are appropriate.

2:15 CHANGING HAZARDOUS WASTE MANAGEMENT PATTERNS IN OHIO IN RESPONSE TO CHANGING REGULATION, INDUSTRIAL PATTERNS, AND FACILITIES AVAILABILITY. W. B. Clapham, Jr., Department of Geology, Cleveland State University, Cleveland, Ohio, 44115.

The patterns of hazardous waste flow throughout the State of Ohio can be deduced from the annual report data collected by the Ohio Environmental Protection Agency. We can specify where wastes of various types are generated, in what industries they are generated, where they go, and what is done to them when they get there. We can document how these patterns have changed over the last few years. More important, we can simulate future changes in patterns of waste generation, including both levels of industrial activity and degree of waste reduction. We can also gauge the impact of various types of regulations, closing of specific facilities and opening of new facilities. As a result, we can develop a reasonable picture of the State's needs for new facilities to manage the hazardous wastes its industries generate.

Scenarios of this sort indicate that the increasing rigor of the hazardous-waste regulatory climate will have a significant, but transitory and manageable impact on some industries. Other industries will not be affected very much, and still others will have extremely severe problems. The implications of these impacts on the planning and siting process will be discussed.

2:30 THE SIGNIFICANCE OF MALATHION ON THE PHOSPHORUS DYNAMICS OF AN ACID BOG LAKE.

Kathryn Lyn Jones, Department of Biological Sciences, Kent State University, Kent, Ohio, 44242

Phosphorus availability limits growth of zooplankton and phytoplankton in Triangle Lake, an acid bog located in Portage County, Ohio. This study examined the effects of malathion, an organophosphorus insecticide, on phosphate uptake by native microorganisms, and release rate of phosphate from dissolved organic phosphorus compounds (DOP), in surface waters of this lake. Two concentrations of commercial grade malathion were used in each assay (4.8 ug/L, 480 ug/L). Uptake by biota was measured radiometrically by adding carrier-free ^{32}P-phosphate to whole lake water, and aliquots (1 ml) were filtered onto 0.45 um and 5.0 um filters at timed intervals. Release rates from phosphomonoesters (PME) were determined from the Vmax, Km and the PME concentration of the water. Acid phosphatase activity (APA) was measured spectrophotometrically using p-nitrophenyl phosphate (pNPP) as a model substrate. Total rate of phosphate uptake by seston on both 0.45 um and 5.0 um filters was significantly lower at both concentrations of malathion. APA was greater in unfiltered lake water samples containing malathion. These results indicate that low concentrations of malathion, such as that which can be found in natural systems, may adversely affect phosphorus-limited aquatic communities.

2:45 RELATIONSHIPS BETWEEN GENETIC STRUCTURE OF ELECTROPHORETICALLY-DETERMINED ALLOZYMES IN FISH POPULATIONS AND EXPOSURE TO CONTAMINANTS. Robert B. Gillespie and Sheldon I. Guttman, Department of Zoology, Miami University, Oxford, Ohio 45056

Electrophoresis is a reliable tool for assessing genetic variability in animal populations. Genetic diversity provides populations with genetic plasticity necessary to adapt to environmental changes. Recent studies show that pollutants lower genetic variability, suggesting that selection pressure is directed at certain genetic loci.

Results from our work show that genetic structure of allozymes in fish populations are sensitive to changes in water quality. Allele and genotype frequencies in fish populations from the field vary according to exposure to contaminants. Additionally, we have shown that under laboratory conditions certain allozyme genotypes of fishes are more sensitive to the toxic effects of contaminants (eg. heavy metals) than other genotypes.

The results of this research indicate that long term exposure to contaminants by aquatic populations may decrease genetic diversity by selecting against sensitive allozyme genotypes. The remaining population is, therefore, more vulnerable to extinction due to a reduced ability to adapt to further environmental stress.

We propose that the use of genetic structure is a sensitive method for monitoring the health of aquatic populations. Additionally, the use of genetic structure analyses may allow for predicting the effects of contaminants on populations in the field.

3:00 DIFFERENTIAL SURVIVORSHIP OF ALLOZYME GENOTYPES IN MOSQUITOFISH (Gambusia affinis) POPULATIONS EXPOSED TO COPPER OR CADMIUM. Norman L. Chagnon and Sheldon I. Guttman, Dept. of Zoology, Miami University, Oxford, Ohio 45056.

Laboratory stocks of mosquitofish (Gambusia affinis) were acutely exposed to copper (0.16-0.24 mg/l) or cadmium (6.7-9.5 mg/l) for 48 h using a static renewal system. Allozyme genotypes at three polymorphic loci: phosphoglucomutase-2 (PGM-2), glucose phosphate isomerase-2 (GPI-2), and isocitrate dehydrogenase-2 (ICD-2) were resolved using starch gel electrophoresis. Differential survivorship of allozyme genotypes was analyzed using a Wilcoxon matched pair signed-rank test.

Copper significantly ($p<0.05$) decreased the overall survivorship of fish heterozygous at the GPI-2 locus. The results for the three individual GPI-2 heterozygotes showed that the frequency of the (ab) genotype was significantly higher in the dead fraction. A significantly higher proportion of females with the (aa) genotype at the ICD-2 locus survived exposure to copper. The frequency of the (a) allele was also significantly higher in the females surviving exposure to copper. A significantly higher proportion of fish with the (bb) genotype at the GPI-2 locus survived exposure to cadmium. The frequency of the (b) allele was also significantly higher in fish surviving exposure to cadmium. The results of this study indicate that some electrophoretically detectable allozymes are sensitive to the quantity and quality of environmental pollutants. This suggests that the genetic structure of natural populations should be considered for use as a biological indicator and monitor of environmental pollution.

3:15 COMPARISON OF THE SENSITIVITY OF ELECTROPHORESIS AND ECOLOGICAL INDICES FOR THE DETECTION OF ENVIRONMENTAL STRESS IN A SOUTHWESTERN OHIO STREAM. CHARLES F. FACEMIRE, David R. Osborne and Sheldon I. Guttman, Department of Zoology, Miami University, Oxford, Ohio 45056.

A variety of diversity, community similarity and biotic indices have been developed for the detection of environmental stress in aquatic ecosystems. Diversity and community similarity indices are often ambiguous or misleading, and biotic indices, by nature, have only limited application. Electrophoretic analysis, however, should detect the results of directional selection induced by pollutants or other stress-causing factors. A comparison of the sensitivity of electrophoresis and Shannon's H', Brillouin's H, Simpson's D, Mcintosh's M, the Jaccard Index, Whittaker's Percentage Similarity, Pinkham and Pearson's B, Chandler's Biotic Index and the Index of Biotic Integrity was conducted. The structures of the piscine and benthic communities from Paddy's Run, a third-order stream receiving runoff from a uranium reprocessing plant near Fernald, Ohio were used for calculation of the ecological indices. Central stonerollers (Campostoma anomalum),

spotfin shiners (Notropis spilopterus), and larval mayflies (Stenonema tripunctatum) were subjected to electrophoretic analysis. Results suggest that electrophoretic analysis is at least as sensitive as any of the ecological indices.

3:30 THE USE OF THE MOLLUSCAN LIFE AND DEATH ASSEMBLAGE IN THE ANALYSIS OF FRESHWATER BENTHIC COMMUNITIES IN EASTERN OHIO. CUMMINS, Hays, Dept. of Geology, Muskingum College, New Concord, OH 43762

The preserved remains of the living community that can be found in sediment has been called the death assemblage. The death assemblage comprises the only record of the history of the community. Ecologists, while always dependent on the composition of the living community for ecological analysis, can use the death assemblage to better interpret changes in community structure and composition over time. Three reservoirs (Salt Fork, Seneca Lake and Wills Creek) were quantitatively sampled as were streams feeding into and out of these impoundments. Eighteen species of unionids were collected; twelve species were found in both the life and death assemblages (Anodonta grandis grandis, Anodonta imbecillis, Lasmigona complanata, Quadrula quadrula, Quadrula pustulosa pustulosa, Tritogonia verrucosa, Amblema plicata plicata, Fusconaia flava, Elliptio dilatata, Potamilus alatus, Lampsilis radiata luteola, and Lampsilis ventricosa) while six species (Strophitus undulatus undulatus, Lasmigona costata, Obovaria subrotunda, Leptodea fragilis, Toxolasma parvus and Epioblasma triquetra) were found only in the death assemblage. The death assemblage was more diverse than the living community; 33% of the species composition was found only in the death assemblage. Interestingly, the life and death assemblages contained no juvenile specimens for any of the 18 species collected. The lack of juveniles in the life assemblage is indicative of a failure of successful recruitment in the current living community while the absence of juvenile unionids in the death assemblage is indicative of recruitment failure over many years.

3:45 MOLLUSCA OF THE MIDDLE BRANCH OF THE PORTAGE RIVER, WOOD COUNTY, OHIO. Mark J. Camp, Department of Geology, University of Toledo, Toledo, Ohio 43606

The Portage River, which drains an area south and east of Toledo, Ohio before emptying into Lake Erie, supports a significant population of mollusks, including unionids, sphaeriids, ctenobranch and pulmonate gastropods. The absence of earlier studies on the molluscan fauna initiated the present study. Anodonta grandis grandis Anodonta cataracta cataracta, Anodontoides ferrusacianus, Strophitus undulatus undulatus, Lasmigona complanata, Fusconaia flava, Truncilla truncata, Toxolasma parvus, Campeloma decisum, Stagnicola catascopium, Helisoma trivolvis, Ferrissia rivularis, Laevapex fuscus, and Physa integra were identified during a survey of a 15 kilometer stretch of the Middle Branch of the Portage River south of Bowling Green, Ohio. The headwater portion has been channelized and was characterized by open soft-substrate pools and narrow weed-choked ditches. Unionids were absent because of ephemeral conditions that develop in the late summer. Physa integra, Helisoma trivolvis, and sphaeriids were the dominant mollusks of this nutrient-rich zone. Deeper pools with sand and clay substrate alternate with bedrock and gravel bar riffles downstream. Anodonta grandis grandis, A. cataracta cataracta, Lasmigona complanata, and Lampsilis radiata luteola were abundant on the edges of the pools, partially buried in sand and cobbles.

4:00 USING MICROORGANISMS TO CLEAN ACID MINE DRAINAGE Jo Davison, Pres./Res. Dir. Lambda Group, Inc., 1445 Summit St. Columbus, OH 43201

The use of microorganisms in natural balanced wetlands systems is proving to be a viable alternative to the chemical treatment of acid mine drainage (AMD). Lambda Group, Inc. has developed a method of cleaning AMD which combines naturally occurring metal-specific bacteria, algae, and protozoa imbedded in a gelatinous matrix called IMPPS (an acronym for immobilized microbial pollution purification systems). This matrix allows pollution-laden water and gasses to pass through freely. The processes of chelation, oxidation, deposition, and decomposition of sulfur and heavy metals occur as a result of natural microbial energy cycles. The IMPPS process is ecologically sound, uses microorganisms indigenous to the area, requires only one application, and is cost-effective. It appears to be a viable, passive, permanent solution to the problem of acid mine drainage.

SECTION R. ECOLOGY
Poster Session -Adena Gym
Saturday, April 30, 1988

Board H @ 3:00 p.m. METABOLISM OF PYRIDINE BY ARTHROBACTER CRYSTALLOPOIETES. G. K. SIMS. Department of Agronomy, The Ohio State University, 2021 Coffey Road, Columbus, OH 43210.

Arthrobacter crystallopoietes uses either pyridine or 2-hydroxypyridine (2-HP) for growth. The organism produces a pigment (derived from 2-HP) during growth on 2-HP but not when grown on pyridine. Previous work in our lab showed that cells grown on pyridine oxidize pyridine without a lag, but require 8-10 hours of induction (by exposure to 2-HP) before 2-HP can be utilized. Similarly, cells grown on 2-HP require induction before they can degrade pyridine. The organism is reported to have a large plasmid which encodes pigment production and utilization of pyridine derivatives. In this study, cells lacking the 2-HP and pigment phenotypes retained the ability to grown on pyridine. The results suggest that the organism either uses separate pathways to degrade these compounds, or only part of the 2-HP pathway is carried on the plasmid encoding pigment production.

Board I @ 3:00 p.m. EFFECT OF CATIONIC COMPOSITION ON PESTICIDE COMPLEXATION BY DISSOLVED ORGANIC CARBON.
S.J. TRAINA/ D. Spontak, and E. O'Loughlin. Department of Agronomy, Room 202 Kottman Hall, 2021 Coffey Road, The Ohio State University, Columbus, OH 43210.

The effects of cation valence, ionic strength, and pH on the complexation of nonpolar pesticides by water soluble soil organic matter was investigated. Solution fluorescence quenching measurements were used to determine the extent of binding of naphthalene to fulvic acid. Increases in cation valence, at constant ionic strength, resulted in decreased complexation of the naphthalene by the dissolved organic matter. Ionic strength and pH were found to have no effect. The decrease in complexation was attributed to cation induced changes in the polymeric structures of the fulvic acids.

SECTION S. INFORMATION AND LIBRARY SCIENCES
Morning Session -Room 2095B Founders Hall
Saturday, April 30, 1988
Margaret Guss, Presiding

9:00 Welcome - Margaret Guss

9:15 MINICOMPUTERS ON A DESK. John C. Blair, Jr. Blair Systems Evaluations, 105 Merle Blvd., Munroe Falls, OH 44262

The SUN Micro Systems workstation, the Apple Mac II, the Compaq 386, and the IBM PS/2 Model 80 have the potential to replace expensive minicomputers. Large fast hard disks up to some 700 megabytes (millions of characters) can be attached to these workstations and made to act as "file servers" in a high-speed networked environment. Ethernet Local Area Networks can connect mainframes, minicomputers, microcomputers and workstations and allow for "distributed databases" to be shared. Data can be downloaded from remote sites or magnetic tapes purchased to give local researchers the same capabilities that formerly existed only at the Lockheed Missile Corporation or the National Library of Medicine computer centers. The Unix operating system allows Wide Area Networks (across the United States) to communicate via automated dial-up access for the transfer of records and for computer conferencing. Implementation of such systems requires a practical knowledge of the hardware and software as well as of the pitfalls of overly ambitious networking.

10:00 HORTICULTURE: INFORMATION AND LIBRARY NEEDS. John Paul Bowles, Horticulturist, Head of the Horticulture Dept., Dawes Arboretum, 7770 Jacksontown Rd. SE, Newark, OH 43055

Arboretums and botanic gardens are types of museums which maintain displays and interpret various living collections for research and educational purposes. The design of specific collections, acquiring of specimens, and taxonomic verification of individual plants, is dependent on library research. This discourse, which includes slide illustrations, examines the horticultural and botanical needs relating to libraries and library work.

SECTION S. INFORMATION AND LIBRARY SCIENCES
Afternoon Session - Room 2095B Founders Hall
Saturday, April 30, 1988
Margaret Guss, Presiding

1:30 SECTION BUSINESS MEETING

2:00 ACADEMIC LIBRARIANS AND INFORMATION LITERACY. Hannelore Rader, Director of Cleveland State University Libraries, 1860 E. 22nd St., Cleveland, OH 44115

Student information literacy is a growing role and responsibility of academic librarians. Bibliographic instruction in a technologic age should deal with the information-computer connection--how computers are transforming the amount and form and organization of information. The identification, processing, and evaluation of increasingly sophisticated and computerized information resources are important skills that need to be developed. Academic librarians must prepare their students for a new information environment.

2:45 PANEL DISCUSSION.

A panel discussion, following Hannelore Rader's paper and including descriptions of innovative programs in academic bibliographic instruction, will be presented by Marian Winner, Head Science Librarian, Miami University; Ann Bolek, Physical Sciences Bibliographer, Univ. of Akron Library; Norma Pearson, Natural Sciences Bibliographer, Univ. of Akron Library.

3:45 DEVELOPING COOPERATIVE EFFORTS BETWEEN ACADEMIC AND SECONDARY EDUCATION LIBRARIES. Chris Miko. Science Library, Bowling Green State University, Bowling Green, OH 43402 and Susan Kunnath Miko. Elmwood Local School District, Jerry City, OH.

Developments in new technology and resource sharing techniques could improve cooperative relationships between academic and secondary education libraries. With the evolution and wide distribution of automated catalogs, monographic or book holdings information can now be easily exchanged among a number of institutions and library sites. As most academic and secondary education libraries produce paper copy serial lists, this type of holdings information may also be exchanged. Once a mutual working knowledge of each library's collection is established, cooperative collection development agreements may be reached. For example, the academic library may collect appropriate general interest indexes while the secondary education library may agree to collect certain popular level magazines. Lastly, use and retrieval of needed materials must be arranged from the various library sites. Methods of of retrieval may include library visits, interlibrary loan, or document delivery through the mail, courier or telefacsimile.

4:00 **FROM DIALOG TO XANADU**
PART 1 - HOW IT'S DONE: ONLINE SEARCHING AT THE UNIVERSITY OF TOLEDO LIBRARIES - Kathleen J. Voigt, Carlson Library, University of Toledo, Toledo, Ohio 43606

Data banks or data bases cannot solve all your problems or answer all your questions, but the applications of computers to the world of libraries has greatly improved the amount and type of information that can be made quickly available to library users. At the University of Toledo we like to think of automated literature searching as an extension of traditional reference service where we receive a request for information, search for the information, and give the information to the user. This paper will describe the automated data base search services at the University of Toledo Libraries, how we instruct classes on its use, changes and experiences encountered during the past ten years of service including statistics and search examples, and current problems. We are now providing the university community with a quick introduction into the global world of information.

4:15 **FROM DIALOG TO XANADU**
PART 2 - WHAT'S NEXT: TRENDS AND ISSUES IN CD-ROM AND NEW ONLINE SEARCH SERVICES. David Reiman, Carlson Library, University of Toledo, Toledo, Ohio, 43606

There are a number of services and software packages designed to make commercially produced databases more accessible, including end-user online search systems such as DIALOGLINK or Wilsearch, and "front-end" software packages like Pro-Search or Sci Mate. These systems, together with databases available on CD-ROM, are creating exciting opportunities and some unique problems for reference services. The University of Toledo Libraries should consider methods for evaluating and selecting the most appropriate services based on the need for the information covered the ease of using the service, reliability and currency of data, and, of course, cost. As with traditional online search services, there are various options for funding end-user services, including user fees, the reference book budget, and/or special appropriations. For those libraries that have underwritten the cost of online searches for students and faculty, the prospect of end-user searching poses a unique problem in control of online connect charges. CD-ROM services, on the other hand, offer the fixed subscription rates, though they are often relatively expensive versus printed counterparts.

4:30 **FROM DIALOG TO XANADU**
PART 3 - WHAT HAPPENS AFTER THAT? THE UNIVERSITY OF TOLEDO LIBRARIES PLACE IN THE GLOBAL INFORMATION ENVIRONMENT. Charles Terbille, Carlson Library, University of Toledo, Toledo, Ohio 43606.

An ideal system of information storage and retrieval will have many advantages. But it will not remove limits from human reading and understanding, slow the proliferation of "what is known," adjudicate conflicting claims, specify patterns to be recognized or articulate the concrete world by assigning symbols to it. There will never be enough storage to handle all possible facts about all possible events from all points of view.

The University of Toledo Libraries are unprepared to deal with information not communicated in English. Yet Japan, China and other nations are becoming important markets and even leaders in science and technology. The American Language Institute at UT has enabled foreign students to function in American Universities. A reciprocal program for Americans is needed, or at least a more global vision.

UT has tried to help Toledo in the transition from a manufacturing to a service economy by concentrating on small enterprise, industrial research and the convention business These programs do not offer the city unique advantages. Some UT science programs are world famous, but they do not relate to the regional economy. Will the university bring together research, teaching and economic development that could occur in no other place?

The Editor thanks Jane Trumbull and Lorraine DeVenney for their invaluable assistance in the preparation of this issue.

THE OHIO ACADEMY OF SCIENCE - Program Planner for the Annual Meeting

Time	Event or Paper	Place
8:00 - Registration and Coffee -		
8:15 -		
8:30 -		
8:45 -		
9:00 -		
9:15 -		
9:30 -		
9:45 -		
10:00 -		
10:15 -		
10:30 -		
10:45 -		
11:00 - All Academy Lecture - 12:00 - Lunch 1:30 - Section Business Meeting		
1:45 -		
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3:00 -		
3:15 -		
3:30 -		
3:45 -		
4:00 -		
5:00 - Annual Business Meeting 6:30 - Academy Banquet 7:30 - Awards & President's Address		